THE

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ELECTRICAL REVIEW.

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THE MINERS' STRIKE.

As we all along anticipated, the threatened strike of miners in Great Britain has now become actual fact, and important history is now in course of being made. On the evening of Thursday last week, the whole of the miners employed in the collieries of Great Britain laid down their tools, with the result that after the lapse of barely a week, practically every trade in the country is either at a standstill or seriously handicapped, and suffering of innocent persons is broadcast over the land. And why? All because a certain class of labourer cannot have all his own way; because he cannot have any wage he likes to demand, irrespective of the amount of work he is prepared to do! In other words, although we are told that the strike is to secure a minimum wage for poor hard-working and starving miners, who cannot, under any circumstances, earn more than a shilling or two per day, in very truth, the inner meaning of the strike is to determine who shall be the masters—workmen or employers? For many years past the miner has had very much more to say in the management of the mines than would be allowed to the worker in any other industry. The mine manager, too, has had to bite his lip and knuckle under at the dictation of the local miners' officials for so long now that he has almost become used to it, and is never surprised at any action they may take or any demand that they may make, and it is undoubtedly this—one is almost inclined to call it "weakness," but it is scarcely that; say rather—*laissez faire* policy that has made the Socialistic miners' leaders believe that they have only to command to get anything they ask for under the threat of a strike.

For days past we have seen the daily Press urging the owners to grant these poor men the minimum wage; then again demanding that the Government must force the owners to give all that the men require. Truth and fact have both been ignored; but it is only a question of time before public opinion, ever on the side of fair play and justice, will condemn the attitude of the leaders and the miners for supporting them. The truth is that the owners *have never* refused to grant the minimum wage, and the fact is that many of the workmen could earn more than the minimum they now ask for if they did an honest, fair day's work every day they *could* work. That there may be individual cases of hardship we do not for one moment deny, but these are the exceptions that prove the rule, and we very much doubt whether, if the workman presented his case to the management in a proper manner, it would not be rectified. As a rule colliery managers and owners are not the hard-hearted slave-drivers that the workmen have tried to persuade the public to believe they are. The risk of having the colliery laid idle through a dispute with a workman over a few shillings, even for a single day, is too great for any manager lightly to ignore any such request—and on this score the Union is all-powerful.

What the owners have refused to grant is to pay a minimum wage irrespective of the ability or inclination to earn such wage, and we doubt if there is a single person—even though he be a rabid Socialist—who will cavil at this refusal. No man can expect to get something for nothing—even the coalowner who rides about in a motor-car, about whom we have heard so much lately, has to do something for what he gets; and if the miner has to be assured of a certain minimum wage each time he descends the mine, without any guarantee on his part as to the amount of work he shall perform, the whole nation may as well shut up shop, for it naturally follows that every other class of workman would expect the same consideration, and bankruptcy would follow. Again, the owners have stated over and over again that they are willing to consider any details for improving machinery to regulate wages in abnormal places. The miners have never even suggested that the existing machinery can be improved, and hence one can only conclude that the abnormal place question is not so severe as we have been—*vide* the daily Press—led to believe. In spite, however, of all the injustice and unfairness of the miners' claims, the Federated employers have honestly tried to devise machinery to regulate both the abnormal place and minimum wage questions, and no fair-minded man can honestly say that their regulations were in any way unreasonable; but the leaders not only refused them, but they refused to place the terms before the miners to vote for their acceptance or rejection. So far as South Wales and Scotland are concerned, the complaint of the owners is that they have definite legal agreements with their workmen which have yet some years to run, and naturally they want some assurance, before they agree to put these on one side and accept new ones, that they will be honoured by the workmen. In short, they are sick to death of their everlasting demands and their failure to stick to their bargains. To the miner a bargain is a bargain only just as long as it suits him, or is in his favour. Another complaint, and a serious one, of all the coal-owners, is the amount of time lost by the miner, hence the insertion of the clause in the terms offered by the federated owners to the effect that if a workman did not attend 80 per cent. of the time the pit worked each week, unless prevented by illness or other justifiable cause, he was not to be entitled to be paid the minimum wage. It is a well-known fact that the time lost increases with increased wages.

To the man in the street it may—and does—appear difficult to understand the objection to a minimum rate of wages, as in most other industries there is, as a rule, a minimum daily rate, but mining is different to every other industry, inasmuch as the area covered by the workings of a coal mine make official supervision in regard to the amount of work done by each miner difficult, as the attention of the officials is fully occupied by looking to the safety of the workmen and regulating the traffic of tubs to and from the shaft. Again, in other industries experience teaches how long a workman may be occupied in doing a certain class of work, especially on a machine, and hence a foreman is easily able to judge whether a workman has done a good or fair day's work. Moreover, in many trades the good workman gets no more than his poor mate, which balances up the cost of the day's output, so to speak, but in the case of the coal-getter he might advance a dozen excuses in the shape of some complaint regarding gas, roof, hardness of the coal, shortness of tubs, or supporting timber, &c., and no one could very well positively contradict him. We have already seen in the engineering trade the tendency of workmen to slack off when guaranteed a minimum wage, and the coal-owners have very good reasons for anticipating a like result.

As for Government interference, we think the matter may be safely left in the hands of Mr. Asquith and his colleagues, and whilst they, in our opinion, have pandered to the men just a little more than their case justified, we are glad to note, from the speech of Mr. Asquith in the House of Commons on Monday, that there is to be no compulsion put upon the owners to pay the minimum wage without some guarantee that there shall be no diminution of output. This, we think, is all the coal-owner asks for, but, at the same time, he will be justified now in also asking that there shall be some guarantee of peace before he agrees to open his mine. We are pleased to see that public sympathy is rapidly changing from the miner to the owner, as the public are really suffering, and are, we think, beginning to see that the whole strike has been brought about, not so much as the result of long suffering and hardships on the miners' part, but rather by an attempt by the Socialistic miners' leaders to force Socialism, or, at any rate, nationalisation of the mines, as a forerunner to the nationalisation of all the means of production and distribution. What will happen in the near future none can foretell; the hand of devastation is fast closing over the land, and the most we can hope for is that the present good temper will prevail, and that the end will come soon, and bring with it a lasting peace.

The Western Local Section.

On Monday last we were privileged to be present at the birth of the latest addition to the family of the I.E.E.—the Western Local Section. As Prof. Wertheimer remarked, an infant that gave a dinner-party on its first birthday must be admitted to be a very lusty one; but there are other features which constitute it, though the last, by no means the least promising of the seven Local Sections. The area to be covered by its operations is very large, and already contains about 126 members of the Institution; it is hoped that this number will quickly be increased to 250, as there are many eligible electrical engineers in the West who have not hitherto thought it worth while to join the I.E.E., in view of their remoteness from any meeting centre. The meetings of the new Section will be held not only at Bristol and Cardiff, but wherever it may be deemed advisable. Further, not only is the chairman, Mr. W. A. Chamen, exceptionally well qualified for that position, besides having had the advantage of presiding over the Glasgow Local Section, but he is admirably supported by the hard-working vice-chairman, Mr. H. Faraday Proctor, and the indefatigable joint hon. secretaries, Mr. W. Collins, at Bristol, and Mr. S. B. Haslam, at Cardiff, and all vie with one another in their enthusiasm and determination to make the Section a success. The inaugural meeting, opened by the President, Mr. Ferranti, was conducted with a business-like dispatch which augurs well for the future conduct of affairs, and the inevitable dinner which followed was equally successful, in spite of the erratic performance of the local railways, by which several would-be guests were prevented from attending. We report the proceedings elsewhere in this issue. Passing reference was made to the initial steps that were taken two years ago, admittedly with a view to the formation of the Local Section, upon which, it will be remembered, we felt it our duty to comment somewhat severely; we cannot agree with the chairman that no soreness was left by the methods then adopted, but we are sure that there is no member of the Institution who will not join with us in the warmest welcome to the new Section and the best wishes for its future prosperity.

Messrs. Crossley Bros.' Dividend and Labour Troubles.

At the annual meeting of Messrs. Crossley Bros., the chairman (Sir Kenneth Crossley), in commenting on the smallness of the dividend—namely, 4 per cent. on the ordinary shares—attributed to labour troubles the small amount of profit made during the second half of the year. At the busiest period of the year, 650 of their best machine-men and fitters ceased work. It might be thought, said the chairman, that they ought to have consented to some form of mediation. He was of the opinion, however, that unless the company were prepared to resign their position as members of the Employers' Association, and unless they were prepared to have every little difference of opinion or grievance the subject of a sudden strike, it was impossible for them to have any discussion whatever as to the matter in dispute until the men returned to work. They were fighting for the principle of negotiation first and the strike afterwards. So long as the present board were in control they would not give any encouragement to the barbarous methods of the sudden strike. If this country was to retain its position in the engineering world, employers must further strengthen themselves and their industries by absolute loyalty to each other, even though it might mean some temporary sacrifices. Mere rates of wages were not everything from the employer's point of view, and it was the employer's business to say how he wanted the work done. The workers must recognise that the comparative price of labour to do that work depended ultimately, more than anything else, on individual or collective merit, and that it was up to the workers to be worth more in order to get more by helping progress and not hindering it; then a great step forward would be made towards better conditions all round.

Labour Problems.

The present coal strike has had the effect of directing the attention of manufacturers and others to the principles of co-partnership as a remedy for labour unrest. Whilst we are thoroughly in agreement with the principles of co-partnership, we realise that from the workmen's point of view there is not a great deal in this, because, although much is made of the fact that whilst the workmen receive individually only a fraction of the wages which the individual employer receives, it is, we believe, appreciated by the leaders of labour that if the whole of the employers' salaries were divided up among the workmen, it would not amount to very much per man per annum. The reason for this is, of course, that the workmen's wages are already paid out of the profits, and the wages of labour are, in the aggregate, many times the salaries of the employers. We are pleased, however, to note that the question of co-partnership is being seriously taken up, and a non-party petition signed by about 120 members of Parliament has been presented to the Prime Minister, recommending the appointment of a Royal Commission to inquire how far the principle of co-partnership could be applied to the industries of the country. It is interesting to note that of those who have signed the petition only about 30 are Liberal and 90 Unionist members, and we should not be surprised to learn that very few of the Labour members have identified themselves with this movement.

Whilst we are on this subject, the following letter read by Sir William Mather at the annual meeting of the shareholders of Mather & Platt, Ltd., will be of interest. Sir William Mather, as is well known, has taken a very great interest in labour problems, and few employers in England are better qualified than he to express an opinion on the subject:—

"When we look at the condition of England, at this moment threatened with a catastrophe through internecine strife between capital and labour in one industry alone, capable of arresting the nation's progress and destroying the work of a century by withholding for an indefinite period the supply of coal—greatest of all Nature's bounteous gifts in the British Isles—we must admit that the methods of barbarism are not extinct, even among us, whose civilisation is assumed to be the highest in the world."

THE "SELANDIA."

Through the courtesy of the owners, the East Asiatic Co., and of Messrs. Burmeister & Wain, the builders, we were enabled last week to inspect the most recent and largest example of a Diesel-engined vessel which has, so far, been brought into commercial use, viz., the motor-ship *Selandia*, now on a voyage to the East. Her gross tonnage is about 5,000 tons, and her displacement nearly 10,000 tons; she is propelled by two eight-cylinder Burmeister and Wain "Diesel" type engines, each developing some 1,250 B.H.P. at a speed of 140 R.P.M., and that both owners and builders are confident of her behaviour, may be gathered from the fact that the former have two similar vessels building for them—one in Denmark and one on the Clyde—while Messrs. Burmeister and Wain are understood to have booked a number of orders for such vessels.

All this augurs well for the Diesel engine. If the naturally conservative shipowner is becoming convinced that he can trust a valuable ship, and even more valuable cargo, on a voyage to the Far East and back, to the tender mercies of a pair of large Diesel oil engines, there is good reason to believe that the old arguments as to the uncertain behaviour of such engines during long periods of continuous running in the central station will disappear.

The main engines each consist of two groups of four $20\frac{1}{2}$ in. diam. × $28\frac{3}{4}$ in.-stroke cylinders mounted on an enclosed crank chamber, with the valve-driving and control gear between the groups. Each cylinder group drives cranks disposed at 180° to each other, but the crank groups are at 90° to each other. Each of the main engines requires about 500 lb. of oil per hour, and the ship is provided with double-bottom fuel storage amounting to 900 tons.

Although there is nothing electrical about the main engines except the small barring motors for turning the crankshafts over, and they can, in emergency, obtain compressed air for starting, &c., from a steam-driven Reavell compressor worked in conjunction with an oil-fired donkey boiler, yet the ship, as a whole, is of considerable interest to electrical folks, and is equipped with electrical auxiliaries practically throughout.

Duplicate 200-H.P. Burmeister & Wain "Diesel" type engines are installed, one on either side of the engine room, coupled in each case to a 220-volt D.C. dynamo and three-stage air compressor in tandem. One of these sets is normally in use for electric lighting and air compressing, but both are required to supply the electrical load when all the deck winches are being worked.

The compressors supply air at 300 lb. pressure to storage tanks in the main engine room for reversing purposes and for the compressors on the main engines, which recompress it to the 900 lb. ordinarily required for starting and fuel-injection purposes.

In connection with the electrical supply a fine marble panel switchboard is provided at the forward end of the engine room on the level of the first engine platform. It contains main generator panels on either side and intermediate panels for motor circuits, lighting, wireless telegraph, &c.

The panels are separated from the bulkhead by some feet, and ample space is provided for working behind the board.

The lighting of the ship is carried out at 110 volts, and to obtain this pressure duplicate motor-generators are installed under the switch gallery. The motors are all supplied at 220 volts, and amongst the engine room auxiliaries which are motor driven, may be mentioned duplicate circulating pumps for cylinder cooling water, duplicate oil pumps for the forced lubrication of main and auxiliary engines, a CO_2 refrigerator engine, and two water pumps—the latter three-throw with bilge, cold and hot water barrels.

For small repairs there are provided a lathe and drilling machine, driven by a motor fixed to the bulkhead.

Some of the engine room auxiliaries are operated by compressed air, notably a ballast pump and oil fuel pump for drawing from the double bottom storage.

It may be mentioned that the donkey boiler supplies steam for heating the stored fuel in cold weather, and thus reducing it to the necessary consistency for engine use; the

steam-driven compressor supplied from the boiler is intended solely for emergency use.

The deck machinery is all electrically operated, and includes a Hele-Shaw-Martineau electro-hydraulic steering gear, a Clarke-Chapman anchor-windlass, and a dozen deck winches for working the cargo.

In all the cases we noticed the motor starters were bracketed to the motors.

Compared with the usual steam-driven vessel as regards machinery space, it may be said that the ship has an engine room, but no stokeholds; and as the engine room is painted white, the machinery pale blue and the pipes brown, one receives an impression of cleanliness and light which is often missing in the usual ship's engine room.

The *Selandia* has no regulation funnel, and this looks odd at first; the engine exhausts are, however, led up one of the hollow steel masts, slots being provided for their emergence about half way up. We shall look forward with interest to the performance of the *Selandia*, and her sister ships, in which so much depends on the reliability of the large Diesel engine and electrically operated auxiliary machinery.

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY *cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.*

Notes on Rheostats.

Referring to the article under the above heading, which appeared in your publication of February 23rd, I entirely agree with "B. K." regarding the very doubtful advantages of overload attachments of a certain pattern. The writer of the article had, no doubt, in his mind overload attachments of the hinged type, where a brush affixed to the hinged armature short-circuits the no-volt spool when the armature is attracted, due to an overload occurring on the motor. It is quite true that the merits of this type of overload (generally in use) are of a very doubtful nature, owing to its tendency to stick and also its uncertain contact. The first fault, of course, may cause serious damage to the motor, whereas the second does not short-circuit the no-volt spool properly. These marked and serious disadvantages are, however, entirely removed by the use of the "plunger" type of overload, where the action is positive and not impeded, and the circuit of the no-volt spool is not shorted but broken.

D. C.

Our Progressing Manufacturing Firms.

In answer to "Central Station," I may say that I saw the unintentional reply furnished by Mr. Hirst, of the General Electric Co., to my letter.

On February 12th I asked a second large "progressing" firm to quote me for the globes in question. As usual, a representative called and took dimensions, &c., but up to the time of writing I am still patiently awaiting their quotation. If their quotation takes so long, Heaven knows when I will obtain the globes!!!

Will some "business" firm answer this letter, when I will certainly get into communication with them and obtain my globes? Price is now quite a secondary consideration with me.

N. D. G.

March 1st, 1912.

I think, as a representative, it is my duty to reply to "Central Station's" letter in your issue of 1st inst.

I should like to point out, first, that I have had a good mechanical and electrical training (both practical and theoretical, as my various certificates can testify); when I say practical I do not mean standing in front of a switchboard or writing up the log-book.

"Central Station" mentions the time of delivery for an 8-B.P. three-phase motor, and a small firm securing the order. In this instance I should like to say that the large firms might have had too many contracts on hand, and it would have been out of place to guarantee delivery to within a few days.

"Central Station" does not say whether the small company *did give* delivery of the motor, &c., within the 14 days; in my experience of small companies they will promise anything so as to secure orders.

I suppose by the new tungsten lamp at Olympia, "Central Station" is referring to the 20-watt Osram. I agree with him in this, but should also like to point out that it is only with certain voltages that the 20-watt lamp has given bother in deliveries. I am willing to sell him 500 20-watt 200-volt Osrams or as many 20-watt 230-volt Mazdas as he wishes. This sentence shows I *am not* a representative of the G.E.C.

Now, to come to the point which made me write this letter and mention in the first part of it my practical experience—"Central Station" mentions the traveller calling upon him and not being able to answer his questions relating to the three-phase motor. Did it not strike "Central Station" that the traveller might have been an expert in some other department of the electrical industry?

A man might be an expert in meters and not know anything about magazine flame arc lamps; there are also plenty of men who are expert in electric bells, but are at sea as regards electric lighting.

My experience in this matter was as follows:—I was calling upon a customer in order to try and sell him motors, meters, circuit-breakers, bell material—in fact, any article pertaining to electricity. All of a sudden he informed me that he wanted "Electrical Apparatus for Epilation." I had to give in there and then, that I did not know anything about the apparatus required. I made it my business to find out what epilation meant, and called the next day upon the customer and sold him the apparatus required.

I defy "Central Station" or any other electrical engineer to be able to argue right away with all the articles the G.E.C. list in their catalogues. Just fancy the branch manager answering questions on turbo-generators to one customer, flame arc lamps to a mains superintendent, central-battery telephone installations to the Post Office engineer, and then a motoring enthusiast comes in and broaches the subject of Oleo sparking plugs.

The above subjects are to be found in different sections of the G.E.C. catalogue.

I shall finish up by asking "Central Station" and others not to be too hard on the representative who cannot reply at once to their questions, but to try and explain to him what they know; he, in his turn, might be able to tell them something they did not know.

Representative.

Electric Cooking and Heating.

I am obliged to your various correspondents for their remarks on my letter some weeks ago, but I think they have somewhat missed the point. In the profession, we all know—or ought to know—what can be done; but the outside public, on behalf of one of whom I originally wrote, do not know and are not told. The recent Olympia Exhibition was intended to inform them, but to my mind, after several visits, it failed. What a fine advertisement some enterprising firm could make of the cry "out with the kitchen fire!"

J. W. Meares.

Calcutta, *February 14th*, 1912.

Earthing Mains.

Is there a Board of Trade regulation to the effect that on a L.T. single-phase network of, say, 200 volts, fed from sub-stations with transformers, the L.T. outers of distributing mains must be effectively earthed in the sub-stations?

Inquirer.

[The earthing regulation applies only to the neutral of a three-wire system; but the outer conductor of a two-wire concentric main may be earthed, with the approval of the Board of Trade.—Eds. E.R.]

LEGAL.

Mechanical Stoker Patent Appeal.

In the Chancery Division on February 29th, Mr. Justice Parker heard an appeal by the owners of Taylor's Patent No. 28,475 of 1904 from an order made by the Comptroller-General of Patents, Designs, and Trade Marks for revocation of the patent under Sec. 27 of the Patents and Designs Act of 1907.

Mr. Walter, K.C., who, with Mr. Fletcher Moulton, appeared in support of the appeal, said that the patent in question related to a mechanical underfeed stoker, and the order for revocation had been obtained by the managing director of Erith's Engineering Co., Ltd. The company were the owners of an old patent here, which would expire in 1913, but in November, 1898, there was certain litigation in the United States, in which it was established that a patent there for Taylor's invention would, if worked, be an infringement of a corresponding patent of Deeley's of 1899, under which Erith's Co. were working in this country. An arrangement was come to between the parties in America, under which Taylor's patent was worked there, and machines made under it were advertised and their sale pushed in this country. Erith's Co., however, intimated that user in this country would be an infringement of their own patent, and the exploitation of the patent in this country was accordingly discontinued. The application for revocation was then made on the ground that the manufacture was mainly outside the United Kingdom. Counsel submitted that the applicants really wanted to revoke Taylor's patent in order that they might use it without paying for a licence. There was a threat of proceedings if the patent was used and then an application to revoke for non-user.

Mr. Moritz, for Mr. Erith, who had obtained the order for revocation, contended that the motives which prompted a person to obtain revocation were immaterial. All applicants for revocation had an object of their own to serve. What had happened in America had made it plain that the appellants could work their patent at a profit, and could do so in this country if they took a licence from Erith's company, as they had originally intended to do. Had a voluntary licence been refused, they could have obtained a compulsory licence under Sec. 27 of the Act.

The Solicitor-General (Sir John Simon) and Mr. Sargant appeared for the Board of Trade.

His Lordship, in giving judgment, said that it was clear that the present owners of the patent, the Lenkes Engineering Co., Ltd., even before they acquired the patent from the executors of the patentee in 1908, had taken steps in this country with a view to exploiting the patent. In 1909 it was decided in the United States that Deeley's patent was the master patent, and in consequence exploitation in this country was dropped. The only persons who could enable the patent to be worked here were the owners of Deeley's patent, Erith's company, who owned that patent, and the applicant for revocation was their managing director. It was clearly in the interest of the owners of Deeley's patent not to grant a licence to the owners of Taylor's patent. The motives of an applicant for revocation might not be material, but under all the circumstances he held that there was reasonable ground for the inaction of the appellants as regards taking steps to work the patent in this country. Sec. 27 was passed for the benefit of the public, and not primarily to confer benefits on individuals, and in considering whether a case had been made out for revocation, the Court and the Comptroller were bound to look first at the interests of the public. Without laying down any general principle, it was impossible in this case to say that non-application by the appellants for a voluntary or compulsory licence was a sufficient reason for revoking their patent, when they could not have worked the patent in this country without risk of proceedings against them for infringement. He accordingly discharged the order for revocation, but without prejudice to a future application for revocation if there was any ground for it. The decision of the Comptroller was accordingly reversed, with costs; the costs, however, before the Comptroller being limited to 20 guineas.

Re National Telephone Co.: Debenture-Holders' Action.

In the Chancery Division, on February 29th and March 1st, Mr. Justice Joyce heard the debenture-holders' action of *In re* the National Telephone Co., Ltd.—Avebury *v.* The Company.

The action was instituted by Lord Avebury and Lord Wolverhampton, as trustees for the debenture-holders of the Telephone Co., to determine the question whether, upon the true construction of the trust-deed and an arrangement made for the sale of the company's undertaking to the Postmaster-General, the debenture-holders were to be paid off at par, or whether, as they claimed, they were entitled to their principal and interest plus a premium or bonus of 3 per cent. The amount in question was, roughly, about £50,000, and that sum had, by arrangement, when the matter was before the Court upon interlocutory motion, been set aside out of the proceeds of sale pending the decision of the action.

Mr. Younger, K.C., and Mr. H. Asquith argued the case on behalf of the plaintiffs, and Mr. Hughes, K.C., and Mr. Percy Wheeler for the company.

Mr. Younger said that it was a friendly action, and neither side desired to embarrass the other. The sale of the company's undertaking took place on December 31st last, and counsel contended that, by a provision in the trust deed, in certain contingencies the debenture stock was to be paid off at a premium of 3 per cent. The question for the Court was whether these contingencies had arisen

Mr. Justice Joyce, in giving judgment, said that he was of opinion that when the motion came before the Court on December 20th the plaintiffs were entitled to the injunction they asked for, because under Clause 9 of the trust deed the company had no power to sell unless it came to an agreement with the plaintiffs under the terms of Clause 6. The events contemplated in Clause 6 had not happened, and that clause, therefore, did not apply. Then there was Clause 5. In view of that clause, and having regard to the fact that a winding-up resolution had been passed by the company, the order of December 20th was dissolved. That being so, it was impossible to decide in favour of the plaintiffs. The action, therefore, failed, and must be dismissed.

Electric Light Company Fined.

At Dulverton (Somerset) Sessions on February 28th, the Dulverton Electric Light Co. were summoned for employing two lads in the station on Sunday, January 7th. Mr. O. A. Skinner, Inspector of Factories, prosecuted, and the defendant company pleaded guilty. There was another charge of not filling in the necessary information on the abstract of the Act. Fines for each offence were imposed, the total sum being £4 4s. 6d. The lads were aged 15.

Wood *v.* Connolly Bros., Ltd.

In the Chancery Division on March 1st, Mr. Justice Warrington heard a summons taken out in this debenture-holder's action, to vary the Master's certificate, which found that an equitable charge on real estate of the company (who carry on the business of cable makers at Blackley, Manchester) took priority of first mortgage debentures.

Mr. Clayson, K.C., who appeared with Mr. Sargant for plaintiff and applicant on the summons, said the company purchased a piece of real estate for £1,100, of which £150 was paid as deposit, and the balance on completion. The company not having the money in hand to complete the purchase, a Mrs. O'Reilly advanced £1,000 to the company and obtained a charge on the real estate in priority to the debentures. Mrs. O'Reilly was not represented by any independent solicitor, but a solicitor was employed who was also the vendor's solicitor. He, rightly or wrongly, made no inquiries into the title of the real estate. The property was conveyed to the company, and the deeds were retained by the solicitor on behalf of Mrs. O'Reilly. Counsel submitted that the equitable charge ranked after the first debentures.

Mr. Cave, K.C., who appeared with Mr. Hartree for the executor of the late Mrs. O'Reilly, said it had been settled that an equitable mortgagee in possession of the title deeds took priority over the debenture-holders; and, further, the mortgagee stood in the place of the vendor, who would have had a lien over the property.

His Lordship refused the application to vary the Master's certificate, and gave the plaintiff leave to appeal.

White *v.* East Ham Borough Council.

In the King's Bench Division, on February 29th, before Mr. Justice Darling and a special jury, Elizabeth White (widow) claimed damages in respect of the death of her husband, who was fatally injured in a collision between his van and an electric tramcar belonging to defendants. The accident happened in Barking Road, Plaistow, last September, and plaintiff now sued the Council under Lord Campbell's Act. Defendants denied an allegation of negligence on which the action was based and pleaded contributory negligence on the part of the late Mr. White, stating that he suddenly drove his van from behind a brewer's dray and that the accident was unavoidable. The jury eventually accepted this view and returned a verdict in favour of the East Ham Borough Council. Judgment was entered accordingly, with costs.

Sackletvala *v.* Miller, Wilson & Pegg.

At the Liverpool County Court, on February 29th, before Judge Shand, Shapurji Dorabji Sackletvala, engineer, of 6, Lombard Street, London, sued Messrs. Miller, Wilson & Pegg, consulting and electrical engineers, of Tower Buildings, Liverpool, and Manchester, for £20 balance of salary, £39 10s. commission, and £75, being three months' salary in lieu of notice, plaintiff alleging that he was wrongfully dismissed on August 2nd. The claim was reduced to £100 to bring it within the Court's jurisdiction.

Plaintiff's case was that he was engaged to manage the Indian department in the Manchester office of the firm, the intention being that, as soon as it was sufficiently developed, he was to proceed to Bombay and then open as agent a branch office for defendants. He began duty on April 3rd, 1909, at a salary of £25 per month, 10 per cent. commission on orders and expenses, and acted until dismissed in writing in August, 1911. In the interim he acted in the firm's interests in various business transactions, and secured orders for machinery for India, these being placed with Lancashire manufacturers.

Mr. H. W. Wilson, in giving evidence, said that when he first met plaintiff, the latter suggested the opening of an office in Bombay, with himself as representative. He mentioned that there would be a chance of the firm securing an appointment as con

sulting engineers to a big Tata hydro-electric scheme in Bombay. Plaintiff was told that he could not be started as Bombay agent until the firm were officially appointed engineers to that scheme, and pending a settlement, plaintiff urged Mr. Wilson to find him some employment, as a position he held with the Westinghouse Co. was becoming untenable. It was then verbally agreed that plaintiff should undertake certain matters for Mr. Wilson personally, his salary being paid by Mr. Wilson.

Mr. T. L. Miller, another partner, denied that plaintiff was in any way connected with the firm. The Tata hydro-electric scheme, which was a bait held out for plaintiff's appointment, was a scheme involving a capital outlay of a million and a half, and the consulting engineer's fees would have come to between £30,000 and £40,000.

The Judge held that plaintiff, anxious to secure the appointment as Bombay representative, accepted temporary employment for Mr. Wilson in his individual capacity, and he therefore gave judgment for defendants, with costs.

Important Edinburgh Tramway Case.

Lord Guthrie, in the Court of Session, recently approved of issues for the trial by jury of an action by a lady against the Edinburgh and District Tramway Co. for £2,000 damages in respect of injuries. Last week the company asked the Court to grant leave to appeal to the House of Lords on the grounds that averments that the car was of faulty construction, in respect that it did not have a guard or screen at the side to prevent anyone slipping underneath, and that not only was the construction of such a guard easy, but that it was practically universally used upon all systems, should be struck out of the record as irrelevant, and should not be admitted to probation. Another ground was that the case should be tried by a judge and not by a judge and jury. Leave to appeal was granted, the Lord President remarking that this was a very important case for the defenders, because the decision affirmed that a jury selected from the ranks of ordinary citizens, with not much training in mechanics, should practically settle whether the whole system of the tramways in Edinburgh was right or wrong.

Martin *v.* Dublin United Tramways Co., Ltd.

Before Mr. Justice Kenny and a special jury at Dublin last week, the trial of this action was brought to a close. The plaintiff, Thomas Martin, is a motor chaffeur in the service of Mr. Martin Fitzgerald, of Dundrun, Co. Dublin, and his claim was for £1,000 damages for personal injuries, which he alleged he sustained by reason of the negligence of the defendant company in the keeping of the roadway between the tramways in Baggot Street in good and proper repair, and in not having a protection round the base of the poles that stand in the centre of the roadway. On July 31st last the plaintiff was driving his master's motor-car into the city. The car was deflected by an elevated stone sett in the roadway, and it ran against the iron standard which sustains the overhead wires. The car was damaged, and the plaintiff sustained terrible injuries. The defendant company denied negligence, and said that the accident was the result of the defective condition of the car, in the steering of which the plaintiff lost control.

Counsel for the plaintiff—Messrs. J. P. Powell, K.C, James O'Connor, K.C., and Mr. E. A. Swayne (instructed by Mr. D. O. C. Miley).

For the defendant company—Serjeant Moriarty, Messrs. James Chambers, K.C., Mr. Henry Hanna, K.C., and Mr. E. A. Collins (instructed by Messrs. Casey, Clay and Collins).

Mr. Justice Kenny said the case for the plaintiff was that the poles were an obstruction to traffic, that they should have a protecting collar of stone at the base, and also that the company were negligent in having omitted to keep the setts on a level with the tram rail. The system, as it now existed, was constructed by the tramway company under the authority of an Act of Parliament, and had the approval of the Board of Trade and of the Corporation of Dublin. Mr. Murphy, the chairman of the company, had told them that before the poles were erected there was a discussion between him and the Corporation, as to whether the poles should be placed in the centre of the roadway or the footways on either side, and that the Corporation insisted upon having them placed in the centre. Undoubtedly, two setts, if not three, were slightly elevated at the point stated in the evidence. That was to a certain extent negligence. But it was for the jury to say whether or not the motor car swerved at that particular place. Neither the plaintiff himself, nor any other witness identified the spot at which the car swerved. They had the evidence of five witnesses that the plaintiff, immediately after the accident, told them that the steering gear had gone wrong, and that he lost control of the car. Two or three expert witnesses had stated that the elevated setts could not possibly have deflected the car out of its course. On the other hand, Mr. Harris, for the plaintiff, said that it was possible. In one sense, unquestionably, they were a source of danger. In a sense they were absolutely unprotected, but relatively they were a source of danger. Compare them with other obstacles in the streets which might be said to be a source of danger. There were electric light poles, public monuments, letter boxes, in the streets. They were obstacles to persons passing along the footpaths, but were they a source of danger? Was this pillar No. 3 in Baggot Street a source of danger to the public generally, or to the ordinary traffic of the streets? In order to find for the plaintiff, the jury should find that it was a danger to some person or thing.

The questions submitted to the jury and answered by them were :—

1. Were the setts at the points where the car is alleged to have swerved in good condition and repair at the time of the occurrence?—No.
2. Were they in a condition to the satisfaction of the road authority?—Yes.
3. Were they in good condition and repair so as not to be a danger or annoyance to ordinary traffic?—Yes, for motor traffic.
4. Did the car swerve in consequence of the defective condition of the setts?—No.
5. Was the swerve due to some defect or breakdown of the machinery of the car; or
5A. Was the condition of the setts the direct and immediate cause of the accident?—No.
6. Could the plaintiff by reasonable care and skill have prevented the car from striking the pillar? (No answer).
7. If so, was the occurrence caused by such want of care and skill? (No answer).
8. Was the pillar a source of danger?—No, not to traffic under proper control.
9. Was the pillar properly protected?—Yes.
10. Would the accident have taken place if the pillar had not been there? (No answer).
11. Did the occurrence take place in consequence of the pillar not being protected by a stone collar at the base?—No.

Mr. Justice Kenny said this was a verdict for the defendant company, and he gave judgment accordingly, but stayed execution at the request of Mr. Powell till the first day of next term.

London and South-Western Railway Co. *v.* British Vacuum Cleaner Co.

The House of Lords on March 4th, by four against three, dismissed the appeal in this case. The Court of Appeal had, by a majority, affirmed the validity of the patent (No. 17,433 of 1901, H. C. Booth, extraction of dust from carpets, &c.).

Dean *v.* Hackney Borough Council.

With further reference to this case, reported in our last issue, the evidence of the plaintiff and witnesses of the collision was to the effect that, at a short distance away, the pillar with the lamp unlighted could not be distinctly seen on the night of the accident, but this was disputed by witnesses for the Borough Council, who asserted that the pillar was distinctly discernible at a distance of over 60 yards. The arc lamp inspector stated that, having found a number of lamps in the road to be working unsatisfactorily, he traced the fault to No. 8 lamp, which he cut off, and then telephoned to the works for the repair staff.

Mr. Spencer Hawes, who investigated the matter for the Borough Council, explained that the lamp was No. 8 in a series of nine lamps connected to the outers of the three-wire direct-current mains, the pressure being 480 volts. The extinction of the lamp was due to a failure of the insulation of the cable in the pillar, which created an "earth" on the circuit and upset the distribution of pressure amongst all the lamps in the series sufficiently to disturb the lighting. The duty of the inspector, on noting the defective lighting would be to find and switch out the faulty lamp so as to restore the remaining lamps to their normal working conditions. There was no indication of any neglect on the part of the officials to take the usual precautions for assuring the efficient working of the lamps and the continuity of the lighting. Cable connectors in arc lamp pillars were liable to be affected by atmospheric conditions and vibration, and protective devices were expressly provided for the purpose of cutting off the current to the lamps in the event of faults or "earths" arising. It was practically impossible to avoid occasional extinctions of arc lamps, but in practice they were very few indeed.

On the conclusion of the arguments of counsel, Judge Williams said that the facts did not show negligence on the part either of the Borough Council or the taxi driver, but that as to the question of the alleged nuisance of an unlighted lamp standard, he would reserve his decision in order to consider the Acts and cases bearing thereon.

Judgment was delivered by Judge Williams on February 26th in the following terms :—"The plaintiff claims damages for personal injuries caused as alleged in his particulars by the negligence of the defendants in leaving an electric street lamp unlighted. It was also, without objection on the part of counsel for the defendants, contended that the mere fact that the lamp in question was not alight was sufficient to make the defendants liable. The plaintiff, a taxi-cab driver, when driving his cab at about 6 p.m. on November 15th came into collision with the lamp standard and the paving at its base, the lamp which was about 28 ft. high not being alight. I find, as a fact, that there was no negligence on the part of the plaintiff. The lamp had been lighted at the usual time, but owing to a "fuse" had been rightly and properly disconnected by the defendants' servant a short time before the accident. I find, as a fact, that there was no negligence on the part of the defendants. Counsel for the plaintiff relied on Sec. 81 of the Electric Lighting (Clauses) Act, 1899 (62 and 63 Vict. C. 19), and on the case of Sadler *v.* South Stafford Tramway Co. (23 Q.B. D. 17). Counsel for the defendants replied that their lighting powers were under an electric lighting order of 1898 (which was put in), and that, therefore, the Act of 1899 could not apply. It turned out, however, that Clause 75 of the order was identical in terms with Sec. 81 of the Act. Subsequently, it was ascertained that the order had nothing to do with the public lighting of streets by the defendants. The case of Sadler *v.* South Staffordshire Tramway Co. seems to me to be clearly distinguishable. The ground of the decision was that the Statutory powers of the defendants did not authorise them to run cars along the highway upon a tramway which was in a defec-

tive condition, and that they were liable for the injury caused to the plaintiff by a car which ran off the line owing to the defective condition of the tramway, although there was no negligence and no knowledge of the defect. In the present case there was no allegation of any defective condition. It seems that the powers and duties of the defendants with regard to street lighting are those prescribed by Sec. 130 of the Metropolis Management Act, 1855 (18 and 19 Vict., C. 120), which are transferred to Borough Councils by Sec. 4 of the London Government Act, 1899 (62 and 63 Vict., C. 14). In my opinion, Sec. 130 does not impose upon the defendants any absolute obligation to keep street lamps alight during the hours of darkness, and unless there has been negligence or improper conduct they are not liable for injury arising from the fact that a street lamp is unlighted. (See Young *v.* Vestry of St. Mary, Islington, 60 J.P. 821). Here there was no negligence or improper conduct, and therefore my judgment must be for the defendants. If leave to appeal is asked, I think that it should be granted with a stay of execution until the hearing of the appeal, if entered within 21 days." It is understood that another action in connection with this accident is likely to come before the High Courts.

BUSINESS NOTES.

Prices Advance.—The Midland Electric Manufacturing Co., Ltd., of Birmingham, announce an increase of 5 per cent. in all net prices from February 26th, in consequence of advances in raw material and in wages.

Messrs. Siemens Brothers Dynamo Works, Ltd., of Caxton House, Westminster, S.W., announce that owing to increased cost of raw materials and wages, all list prices for conduits and conduit fittings are advanced by 5 per cent. as from March 4th.

"Angold" Street Lighting.—Amongst recent important orders received by the G.E.C. for their "Angold" magazine flame arc lamps for public street illumination, are the following:—Glasgow, over 170 lamps; Liverpool, 74 lamps. Arc lamps of the same type have also recently been supplied, and they are now in use for similar purposes in the following districts:—Southwark, St. Pancras, Birmingham, Sunderland, Poplar, Manchester, Wednesbury, Perth, &c.

Book Notices.—*The Engineers' Year-Book* of Engineering Formulæ, Rules, Tables, Data and Memoranda.—By H. R. Kempe, M.Inst.C.E. 1912. London: Crosby, Lockwood. Price 10s. 6d.—This well-known publication, which now enters on its nineteenth year, has been extended by over 100 pages; amongst the sections which have been entirely rewritten and enlarged are those on internal-combustion engines, and reinforced concrete construction; the sections on hydraulics and hydro-electric plant, and electrical engineering, have also been revised and extended or rewritten. The section on Electrical Engineering is very comprehensive, and of a thoroughly practical nature, the tables and specifications of the leading manufacturers, as well as of the British Engineering Standards Committee, being freely drawn upon. Where possible, actual working results are given, and the figures are well up to date. It is difficult to turn over the pages of this pocket encyclopædia of engineering without being compelled from time to time to pause and peruse the contents as some interesting illustration catches the eye. The list of contributors contains many well-known names; but we regret to see that several of these are followed by those objectionable initials "C.E." A man may be justly entitled to style himself "Civil Engineer," but no man is entitled to append initials to his name without the sanction of recognised authority, and the use of these letters (which usually signify that the user is *not* a member of the Institution of Civil Engineers) is very bad form.

Spon's Architects' and Builders' Pocket-Book. 1912. London: E. & F. N. Spon. Price 5s. net (two volumes).—This very handy reference book is again issued in two parts—the Memoranda Section, and the Prices and Diary Section. The former is alphabetically arranged, and consists of technical information and data of all kinds covered by the title, a very wide range. Under "electric lighting" there is a slip in the note on automatic electric lighting (page 98), the statement that a storage battery is unnecessary being wholly incorrect; and on the following page it is rashly stated that cooking by electricity cannot possibly compete in cost with more common methods. In view of the wide difference between carbon, tantalum and tungsten-filament lamps, it should be clearly stated which is under consideration at any time; the data show many signs of having been drawn up in the days of carbon-filament lamps, and subsequently inadequately touched up to meet the newer conditions. For example, in the last paragraph on page 111, we are told that the cost of the light "from the company's main" is roughly about ½d. per hour per 16-c.p. lamp; with electricity at 5d. per unit (it is generally cheaper) and tungsten lamps, the cost would be $\frac{1}{10}$d., not ½d. per hour. These remarks apply also to the price-book section, where the prices given in terms of carbon-filament lamps in some cases are quite useless under modern conditions—worse, they are misleading. The note on page 193 that certain prices can be reduced 50 per cent. if metallic-filament lamps are used, is a slovenly device; the whole of the prices affected by the change which *has taken place* (but which the editors still seem to regard as a contingency only, for the same course was followed in the previous edition) ought to be revised in the light of modern practice.

The London Telegraph Training College, Ltd., of Morse House, Earl's Court, S.W., has sent us an illustrated brochure describing the aims and equipment of the College, which provides instruction in all classes of telegraphy—land, cable, and wireless. During recent years a workshop class has been established, and has proved very popular, as well as useful to students. For the training of wireless operators a radio-telegraph station has been erected at Acton by the company, about six miles from headquarters, and equipped with standard apparatus—three different systems being represented. The large number of signed testimonials printed in the brochure bears witness to the efficiency of the training provided by the College.

"The *Electrician* Wireman's Pocket-Book and Electrical Contractors' Handbook." By A. W. Robinson and W. E. Warrilow 1912. London: *Electrician* Printing and Publishing Co., Ltd Price 5s. net.

"Neuerungen im Dampfkessel und Feuerungsbau." By Oberingenieur R. Klein. Zurich: Jean Frey.

"*Journal* of the Institution of Municipal Engineers." Vol. III No. 4. February, 1912. London: The Institution. Price 1s.

List of Additions to Lewis's Medical and Scientific Circulating Library, 136, Gower Street, W.C.

"The Physical Review." Vol. XXXIV, No. 1. Lancaster, Pa.: The *Review* offices.

"Coals available for the Manufacture of Illuminating Gas." By A. H. White and Perry Barker. "The Uses of Peat for Fuel and Other Purposes." By Charles A. Davis. 1911. Washington: Government Printing Office.

"Atti della Associazione Elettrotecnica Italiana." January, 1912. Milan: Stucchi, Ceretti e C.

"*Proceedings* of the Physical Society of London." Vol. XXIV, Part 2. February 15th, 1912. London: *Electrician* Printing and Publishing Co., Ltd. Price 4s. net.

"Meteorological Instruments and Weather Forecasts." London: Percival Marshall & Co. Price 6d. net.

"*Journal* of the United States Artillery," with "Index to Current Military Literature." Vol. XXXVII, No. 1. January-February, 1912. Fort Monro, Va.: Coast Artillery School Press.

"Liquid Fuel and its Apparatus." By William H. Booth. Price 8s. 6d. net. "American Electric Central Station Distribution Systems." By Harry B. Gear and Paul F. Williams. Price 12s. net. "The Seven Follies of Science." By John Phin. Price 5s. net. "An Introduction to the Study of Fuel." By F. J. Brislee. Price 8s. 6d. net. "Direct and Alternating Current Manual." By Frederick Bedell and Clarence A. Pierce. Price 8s. net. 1912. London: Constable & Co., Ltd.

"Annual Report of the Smithsonion Institution for the Year ending June 30th, 1910." Washington: Government Printing Office.

"Wiring Calculations." By G. W. Lummis Paterson. 1912. London: Scott, Greenwood & Son. Price 5s. net.

"*Transactions* of the Illuminating Engineering Society," Vol. VII, No. 1. January, 1912. With index to Vol. VI. Easton, Pa.: Illuminating Engineering Society. Price 75 cents.

Dissolutions and Liquidations.—Mr. Charles F. Cape, the receiver and liquidator of The Langdon Davies Motor Co., Ltd., announces that he has disposed of the business as a going concern, and is not responsible for anything that may be ordered on its behalf after March 2nd.

Electrical Trust, Ltd.—A meeting is called for April 10th at 13, Finsbury Circus, E.C., to hear an account of the winding up from the liquidator, Mr. H. Garton Ash.

Power Accessories, Ltd.—A meeting is called for April 10th at 31, Budge Row, E.C., to hear an account of the winding up from the liquidator, Mr. S. P. Hutton.

Crown Engineering Co., electrical and mechanical engineers, 78, Lees Road, Oldham.—Messrs. J. Lindsay, J. Bullivant and J. Barnes have dissolved partnership. Mr. Barnes attends to debts, &c.

Venables & Co., electricians, 99, Cricklewood Broadway, London, N.W.—Messrs. A. V. Cooke and J. H. Painter have dissolved partnership. Mr. Painter attends to debts, &c., and continues the business.

Lumen Fittings Co., chandelier and electric fittings manufacturers, Bromsgrove Street, Birmingham.—Messrs. H. Hateley and J. H. Leather have dissolved partnership. Mr. Hateley attends to debts and continues the business under the same style.

Electrical Shows Co., Ltd.—A meeting is called for April 3rd at 6, Old Jewry, E.C., to hear an account of the winding up from the liquidator, Mr. W. G. Blakemore.

Magneto Co., Ltd.—A meeting is called for April 3rd at 35, Newhall Street, Birmingham, to hear an account of the winding up from the liquidator, Mr. C. H. McPherson.

Catalogues and Lists.—Messrs. B. R. Rowland and Co., Ltd., Climax Works, Reddish, near Manchester.—Twelve-page catalogue containing full particulars, with excellent half-tone pictures, of their "Universal" motor-driven grinding machines for heavy and medium-heavy work, both direct and indirect driving types being shown; the firm's combined face and universal grinding machines, combined disk and periphery wheel ditto, heavy double tool grinding machine, with centrifugal pump, direct-driven double tool grinder, are also similarly covered in the list, as well as grinding wheels and mountings for same. A price table of grinding wheels appears at the end of the catalogue.

Messrs. Simplex Conduits, Ltd., 116, Charing Cross Road, London, W.C.—Catalogue of 120 pages containing new editions of Sections T. D. U. and M. These four sections cover the following: T, conduits and fittings; D, distribution boards, switchgear and enclosed fuses; U, Simplex flexible wiring system; M, watertight fittings and reflectors for mills, factories, ships, &c. The lines in the last of these sections have been considerably extended. Illustrations abound, and there are brief descriptions with prices very clearly arranged. The tool section has also undergone considerable revision and extension. A number of pages are now devoted to illustrations and prices of various wiremen's tools required in everyday installation work, such as screwing tackle, speed counters, micrometer gauges, portable tube vices, &c. The fuse section has been added to by the inclusion of Hope's bi-metal fuse wire, the 5 and 10-ampere sizes of which are now ready for delivery. In the section dealing with reflectors, &c., for factory lighting, there are now included pressed steel reflectors manufactured under the Holophane-Benjamin patents. A separate four-page supplementary list (I. 1.) has also been issued, giving excellent illustrations, particulars, and prices of three standardised types of Simplex time switches, suitable for operating window lights and small signs, these switches being made under the Venner patents.

Mailing Card (No. 179), illustrating and giving prices of their electric hair dryer and particulars of their electric vibrator.

Messrs. R. H. Patterson & Co., Ltd., Forth Street Works, Newcastle-on-Tyne.—March catalogue of new and second-hand machinery for sale or hire.

The British Insulated and Helsby Cables, Ltd, Prescot.—Twenty-page catalogue, with a quite effective cover, containing full descriptive information regarding the Helsby patent condensers for electric lighting with alternating current. Diagrams of connections of the parallel and series systems accompany the explanatory matter, and the cost of installing the system, as compared with that of high-voltage lamps, is discussed. Prices are set out in detail for both series and parallel systems for various voltages.

Messrs. Laing, Wharton, Ltd., 7, Great Newport Street, London, W.C.—Circular illustrating a couple of dozen types of their "L.W." fancy cascade bead shades, with fully-tabulated prices, also showing their portable electric fountains.

The British Aluminium Co., Ltd., 109, Queen Victoria Street, London, E.C.—Leaflet No. 122, giving particulars relating to the application of aluminium for driving pulleys. The company supply not only pure aluminium in ingot and semi-manufactured form, but also aluminium alloys suitable for such castings as pulleys, jigs, &c. Copies of the leaflet will be sent to anyone interested.

Mr. H. W. Turner, Nutaford Vale Works, Manchester.—Illustrated folder containing a description of his patent portable unit quick-baking oven for armatures, field coils, &c., in which, it is claimed, any armature or other work less than 17¾ in. in diameter may be baked within three hours. The oven can be heated by gas or paraffin assisted by waste products from the drying chamber.

Messrs. Siemens Bros. Dynamo Works, Ltd., Tyssen Street, Dalston, London, N.E.—16-page catalogue, containing illustrations, some technical details, and prices of their various types of tantalum drawn-wire lamps, with round and pear-shaped bulbs, also traction type, tubular flame, candle and other lamps. Views of interiors, exteriors, ships, and trains where the lamps are in service are given.

The Luna Metal-Filament Lamp Agency, whose new address is 5, Denmark Street, Charing Cross Road, W.C., have issued a price circular of their Luna metal-filament lamps.

Messrs. Adams Manufacturing Co., Ltd., Bedford.—A 56-page catalogue of electric control gear applied to wood-working machinery has been issued. The ground covered may be gathered from the following titles of the nine chapters: General Considerations; Features Essential to Good Control Gear for Wood-working Machinery: Group Driving; Individual Driving; Speed Regulation; Shunt Speed Regulators; Series Speed Regulators; Auxiliary Machines; Concluding Remarks. The book is appropriately illustrated throughout with pictures of the Adams apparatus and of saw benches, planing machines, sand-papering machines, &c., fitted therewith. The catalogue should be of service to those interested in problems met with in the electrical driving of machinery of this class, and copies can be obtained by any reader.

Messrs. Duncan Watson & Co., London.—The firm are prepared to issue to electric supply companies quantities of leaflets without their name, drawing attention, by illustration and otherwise, to the advantages which the householder can secure by making use of an electric vacuum cleaner at the time of spring-cleaning.

Belgium.—La Société des Cables et Caoutchoux de Selessin is the name of a new company which has just been formed at Selessin, with a capital of £10,000.

Trade Announcements.—Owing to increased business the Detroit Engine Works have removed from Gamage Building to larger premises at 94, Hatton Garden, London, E.C.

The Electrical and Motor Co., of 3, Horse Fair, Banbury, announce that their new telephone number is "112 Banbury."

Messrs. Alfred Herbert, Ltd., of Coventry, have just opened an office at Atlas Chambers, King Street, Leeds.

The Automatic Standard Screw Co., Ltd., of Halifax, has been, for family reasons, converted into a private limited company, but there will be no alteration in the conduct and management of the business.

Mr. Geo. C. Booth, electrician, has opened new premises at 27, Silver Street, Whitby.

For Sale.—The works and business of Messrs. Ernest Scott & Mountain, Ltd., Gateshead, are offered for sale as a going concern. See our advertisement pages to-day.

White City Exhibition.—This year's event at Shepherd's Bush will be an Anglo-Latin Exhibition. Products of and matters relating to France, Italy, Spain and Portugal, will be strongly in evidence, and there will also be a South American section. A special British section is being organised wherein the exhibits will be limited to such subjects as will afford new outlets for trade with the Latin races.

Bankruptcy Proceedings.—The affairs of Wm. Jacob Van Haytema, the promoter of the International Telegraphic Appliances, Ltd., came before Mr. Registrar Linklater on Tuesday, at the London Bankruptcy Court, upon the debtor's application for the Court's sanction to a scheme of arrangement. Mr. E. S. Grey, Official Receiver, reported that the debtor failed in October, 1907, with provable claims £14,076 and assets that had realised £387. A dividend of 7d. in the £ had been paid, and the debtor now proposed to pay a composition of 9s. 5d. in the £ in full satisfaction of his debts. A Dutch subject, the debtor formerly traded in partnership as a banker at Amsterdam, and there failed in 1892, paying about 4s. 8d. in the £ on liabilities of £25,000. He then came to this country, and commenced business as an agent for Dutch printing firms and for the sale on commission of Dutch paintings. In 1900 he founded the Dutch Art Gallery at 14, Grafton Street, W., and in 1905 he sold that business to the Dutch Gallery, Ltd., which was wound up in May, 1906. The debtor in the following September promoted the International Art Gallery, Ltd., which was a failure, and about the same time he was engaged in endeavouring to obtain on behalf of a syndicate a concession from the Dutch Government for the installation of wireless telegraphy to the Dutch East Indies. In June, 1906, he registered the International Telegraphic Appliances, Ltd., with the object of dealing in telegraphic appliances, but no business resulted, and the company was a failure. The debtor borrowed upwards of £5,000 in connection with the negotiations for the wireless installation. Creditors pressed for payment in September, 1907, and a receiving order was obtained on the petition of a creditor. The previous failure was alleged by the Official Receiver as an offence against the Act. His Honour, upon the application of Mr. Hansell, approved the scheme.

Charles Oldham McMillan, electrician and cycle dealer, 15, High Street, Portmadoc, Carnarvonshire.—The first meeting of creditors herein was held at Crypt Chambers, Chester, on February 29th. It appeared that the receiving order was made on the debtor's own petition, and according to the accounts filed, the liabilities amounted to £100 and the assets were estimated to produce £6, leaving a deficiency of £94. The failure was attributed to bad trade, sickness in family, big rent, and large family. It was decided to leave the matter in the hands of the Official Receiver.

Harry Thorpe, electrician and engineer, late of High Holborn and Holloway, London.—Application for debtor's discharge will be heard at Carey Street on March 26th.

LIGHTING and POWER NOTES.

Allington.—As it is proposed to have the E.L. installed at the Castle at Allington, and the Quarries, the Maidstone T.C. has applied to the B. of T. for an order empowering it to supply the energy. Allington is outside the borough area.

Argentina.—Messrs. Buxton, Cassini & Co., on behalf of Brazilian capitalists, have obtained a 40 years' concession from the municipality of Pelotas, Rio Grande del Sud, for the erection of an electric plant in that town. The scheme includes both public and private lighting and about 34 km. of tramway. Several German firms also competed for the concession.—*Review of the River Plate.*

Bispham.—The electric supply was available for the first time last week, the first building to be electrically lighted being a new church. There are already 80 consumers on the books. The scheme was estimated to cost £10,000. Ten miles of cable have already been laid, the price for current being 5d. per unit for lighting, and 2d. for heating and cooking. The plant has been installed under the supervision of Mr. J. W. Speight, consulting engineer, of St. Annes. The new destructor is an experiment; the crusher, supplied by the Lightning Dust Manipulator Co., of London, has a capacity of 30 to 40 tons a day; the machine, which is driven by a 40-H.P. motor, is the first of its kind in Lancashire. The cost of the machine and building was about £750. The generating plant comprises two 60-H.P. gas engines, and two suction plants, supplied by the National Gas Engine Co. The two 48-KW. dynamos are by Bruce Peebles, and the switchboard by Kelvin & White. The battery is of about 250 ampere-hours capacity, and was supplied by the Premier Co.

Blackburn.—A L.G.B. inquiry into the application of the T.C. to borrow £45,170 for the electricity undertaking was recently held. The Town Clerk said the basis of the scheme was to secure new machinery to meet a demand for increased power, much of which would have to be supplied a

considerable distance from the works. The Inspector said the total capacity of the electrical station was given as 4,342 KW., and the maximum demand upon it was 3,300 KW. That gave 1,000 KW.—25 per cent.—to spare. That was usually regarded as sufficient surplus. The Town Clerk replied that this was not a surplus for all purposes. The electrical engineer said another reason for the application was the lack of suitability of certain of the existing plant. The Inspector (surprised): The portion regarded as unsuitable amounts to quite one-half of the plant. The Town Clerk said before the plant was installed there was an acute controversy as to what kind of machinery should be purchased; a considerable number were in favour of rather old-fashioned plant, and a consulting engineer of eminence was called in and advised the buying of the plant in question. That was the unfortunate history behind the matter. Referring to the future demand upon the electrical plant, the Inspector said the electrical engineer had said there was a prospect of increasing the demand by 21,000 H.P.

It was stated that the aggregate losses on the undertaking amounted to £2,969 and profits to £13,506, leaving a balance of £10,537, of which £5,164 had been used for writing off assets for renewals and £5,373 was in hand, and that a full and complete scheme of extensions had not been drawn up as yet, leading the Inspector to remark "I don't think the Board will sanction the loan until you have done something definite in the matter." The inquiry lasted nearly three hours.

Brighouse.—The T.C. has decided to apply to the L.G.B. for sanction to borrow £3,000 for the provision of electric cables during the next three years.

Brighton.—The Lighting Committee of the T.C. has recommended the investment of £100 in the provision of electric laundry irons to be let out on the hire-purchase system for eight quarterly payments of 2s. 3d. for each iron.

The Council is also recommended to adopt a scheme of wiring consumers' premises on the hire-purchase system, the work to be done by contractors, who are to be paid 1d. per unit received by the Council over 4d. per unit for current consumed by the occupants of the premises wired on the above system.

Burton-on-Trent.—A L.G.B. inquiry was held on February 29th into the application of the T.C. for a loan of £15,000 for electricity purposes. There was no opposition.

Cheltenham.—The T.C. has decided to give private consumers now paying 5½d. and 4d. per unit under the maximum demand system the option of a flat rate of 5d. per unit.

Colne.—The T.C. has decided to accede to the request of the inmates of the Hartley Homes to supply them with electricity at a preferential rate. A request from the Colne Tradesmen's Association for the Electricity Committee to receive a deputation to consider the question of providing electricity at a cheaper rate was agreed to, though nothing will be decided at the present juncture.

Continental Notes.—France.—A comprehensive electric scheme has been planned and partly realised by the company styled the Electrique de Loire-et-Cher. Its scope is to supply lighting, motive power and traction current to the extensive region lying on both sides the River Loire, constituting a quadrilateral, of which Châteauroux, Langeais, Chartres and Châteauneuf are the boundary points. The scheme is too large to be handled by a single company, and in consequence subsidiary companies have been formed to deal with separate portions of the scheme. One of the most important of these latter is the Société des Tramways et de l'Electricité de Touraine, which, taking over certain existing departmental electric lines will, by a number of extensions, provide cheap and rapid transport of agricultural products to Paris. The main lighting and power network is divided into some five sections. The Touraine section is temporarily served by a station at Ambroise, and some 14 or 15 communes have been supplied since April last. Others are being connected. From the new generating station which is being built three distribution lines will radiate: one descending the valley of the Indre and supplying the communes on each side of that river; another following the valley of the Loire, and a third the valley of the Loir. Another section will have Orleans for centre. A third section is situated in the valley of the Cher; a fourth embraces the region about Chartres; and a fifth, the district between Saulzdre and Salles. In framing this scheme the parent company has had in view the provision of cheap current and its distribution direct to the regions concerned, by means of the subsidiary companies, which, with the tramway company, constitute its exclusive *clientèle*.

Considerable activity in the installation of electrical machinery is observable at various French ports. At Nantes the Chamber of Commerce has adopted a report advocating the installation of nine electric cranes; at Havre the local Chamber has decided to install even electric cranes and to utilise electric power for the goods-handling appliances at the goods warehouses at Graville; at La Rochelle the Chamber has referred to the Commission des Ports a scheme of underground distribution, with a view to providing light and power around the basin of La Rochelle-Pallice, and both at Marseilles and at Brest the municipal Councils are considering schemes for the introduction of electric services.—*La Revue Pratique.*

The establishment of a co-operative generating station at Breillecourt, in the department of the Aube, is proposed, which will supply seven neighbouring communes.

A new company has lately been formed at St. Mard (Siene-et-Marne) with a capital of £28,000, and the title La Compagnie Centrale Electrique de St. Mard-sous-Tammarten, to establish a central electric lighting station in the town.

Hungary.—A hydro-electric scheme, to cost 8,000,000 kronen, is mooted, to utilise the waters of the Talabor and Magyag rivers, in the county of Miramaros, in Upper Hungary. It is proposed to found a company to carry out the scheme.—*Zeit. f. d. ges. Turbinenwesen.*

Spain.—The rivalry which has broken out between the three large electricity companies which supply Barcelona, previously alluded to, is having for result a great reduction in the prices at which current is sold. A rate of 5 centimos the KW.-hour, and even lower, is being offered to large power consumers; to smaller users a quotation of 8 centimos the KW.-hour is offered; and to the general public 10 centimos. These prices are most advantageous to industrial consumers, and even the higher rates will stimulate the majority of minor industries in which Barcelona abounds.—*Industria e Invenciones.*

Belgium.—An electric generating station is to be established at the new St. Barbe-et-Guillaume Lambert collieries at Eysden in the Campine district. It will contain two sets of Brown-Boveri steam turbines and alternators of 2,000-KW. capacity each.

Cuba.—The *Gaceta Official* of Havana has published a decree authorising the T.C. of Palma Soriano, in the Province of Oriente, to take the necessary dispositions for the establishment of a central generating station for the production of light and motive power.—*La Lumière Electrique.*

Darwen.—The question of driving mills by electricity is not to be allowed to lapse in Darwen, despite the fact that negotiations between the Corporation and the pending lessees of a proposed new mill for electric power have failed. The owners of another mill now worked by steam have approached the Corporation for terms, and if these can be arranged electric driving will be resorted to.

Dundee.—The Corporation Electricity Committee last week approved of further concessions to consumers proposed by Mr. H. Richardson, the engineer. A member pointed out that under the new House Letting Act probably all the stairs in the city would be lighted, that this was the time for the Electricity Committee to make a bid for the work, and that if the C.P. was increased it would do the department a great deal of good. In the course of further discussion, Mr. Richardson said it was time people were getting conveniences to use electricity more widely; he believed it was as cheap as gas. The town clerk having hinted that there was a likelihood of additional rating on the department, Mr. Richardson said this was most unfair. Why was it, he asked, that an electricity consumer should pay 2s. 10d. against a little over 9d. by a gas consumer? A member retorted, "Because of Parliamentary powers"; and to this the engineer replied that Parliamentary powers were not always correct, morally speaking. The revenue of the electricity department was only one-third of that of the gas department, and yet both departments paid practically the same in taxes. In the course of the discussion, it was pointed out that Aberdeen was bringing out a prov. order to put electricity on the same basis as gas.

At the same meeting it was agreed to adopt Mr. Richardson's suggestion that to meet the increasing demands on the department a new sub-station be erected in the Dock Street area. In his report the engineer pointed out emphatically that the experience of last winter and other considerations rendered it imperative that additional sub-station machinery and cables should be installed.

The "maximum demand" system of charging for current has apparently ruffled some one's feelings. A member of the Dundee Corporation Electricity Committee, referring to it the other day, said he had heard it described as the "maximum bedamned" system.

Dudley.—A new feeder cable is to be run from the generating station to Hall Street, and also from the generating station to Eve Hill, at an estimated cost of £4,012, owing to the existing cables being fully loaded.

Eastbourne.—The electrical engineer reports that the turbo-alternator recently developed vibration, which necessitated the plant being shut down. On examination, some of the blades were found to be distorted and the shaft out of truth. These matters were put right, but several days later the same excessive vibration occurred. The Electricity Committee has decided to leave the matter in the hands of the engineer, and has desired him to report upon the advisability of purchasing additional plant.

Eccles.—Extensions are to be carried out at the Corporation Electricity Works at an estimated cost of £3,193.

Epsom.—For the three quarters ending December 31st, 1911, the gross profit on the electricity undertaking is given as £436 and the net profit as £263. The Lighting Committee recommended a reduction from £4 10s. to £4 per lamp for the 429 public lamps, this meaning a saving of £214 10s. on the lighting account. The B. of T. has sanctioned the supply of electricity to certain premises at Ewell.

Exhall.—The P.C. has approached the Coventry T.C. with reference to a supply of current for the parish, and the Corporation has offered to give a supply on a guaranteed revenue for five years equal to 20 per cent. on the cost—£1,256 per annum. The capital outlay for mains, sub-stations, duplicate high-tension mains, &c., is estimated at £6,280.

Glasgow.—The T.C. has sanctioned the Electricity Committee acquiring ground in Maryhill and Trongate districts, for the purpose of erecting two sub-stations for transforming machinery.

Grimsby.—The Corporation electricity department has recently opened temporary showrooms in one of the main streets of the town. The premises have been fitted up in an artistic manner, and stocked with apparatus loaned by the contractors in the town, and arrangements are made so that any consumer wishing to purchase apparatus has his order executed by the contractor who has loaned it. The showrooms have been much admired, and the reflected-lighting system appears to be generally approved. Electric cooking is being actively pushed, the "Tricity" cooker being the one chosen for special attention. Mr. F. S. Grogan, of the Berry Construction Co., gave demonstrations on four days last week, the room being packed at each demonstration with people, who keenly followed his very able lecture. Various other devices and fittings are shown, and the final touch is added with an electric flashing sign over the doorway, which invites the visitor as he goes out to "Call again."

A L.G.B. inquiry was held on February 27th into the application of the T.C. for a loan of £700 for plant at the power station. There was no opposition.

Haverfordwest.—At a T.C. discussion on a recommendation to purchase a new gasometer, an amendment was accepted that the question of lighting be referred to a special Committee for consideration, the speaker being of opinion that the town could be electrically lighted from the river Cleddau.

Kingston-on-Thames.—The T.C. has applied to the L.G.B. for a loan of £13,500 for the installation of Diesel oil engines, &c., at the electricity works.

Lagos.—The electric lighting system is to be extended at a cost of £18,000.—*African Engineering.*

Lancaster.—On the recommendation of the Electricity Committee, the T.C. has reduced the price of electricity for private lighting purposes from 4½d. to 4¼d. per unit.

London.—Kensington.—The Infirmary Committee of the Guardians reports that after careful consideration of a letter from the Gas, Light and Coke Co. and a report from Mr. E. Flint, architect, and Mr. Wagg, consulting engineer, on the proposals contained in such letter, it has decided to adhere to the views contained in a report, which was adopted by the board on January 4th, in favour of the installation of electric light at the infirmary, and has decided to instruct Mr. Flint to prepare a specification and estimate of the cost of such installation.

Islington.—The Lighting Committee has decided to charge a uniform price of 1d. per unit for current used for illuminating signs put up by wiring contractors in connection with their own businesses, providing that the Council's prices for current for lighting, heating and power are prominently advertised thereon. With a view to improving the lighting of Upper Street, the Committee has decided to put up 12 special flame lamps, which can be used on rectified circuits. The price of each lamp is £5 7s. 6d., and the special carbons required are somewhat costly as compared with those used in existing lamps.

Fulham.—The Electricity Committee reports having entered into an agreement for the supply of energy required for power and lighting purposes at Earl's Court Exhibition. It was originally contemplated that the maximum demand would be 400 kw., but from the plant already installed, and the alterations which are being made, this will be increased to 600 or 700 kw. To meet this extra demand the Committee has decided to increase the cables, transformers, and ducts, and application is to be made to L.C.C. for a loan of £3,200, the estimated cost of the work. The attention of the Committee has been drawn to the very weak condition of one or two of the H.T. arc circuits, and it is of opinion that considerable improvement may be effected by the conversion of the arc to metallic-filament lighting. The Committee thinks that in the first instance, only 71 lamps should be altered. The cost of running these lamps on the present system the electrical engineer puts at £1,217. Against this would be the cost by changing over, which he puts at £1,080, which makes a difference in favour of metallic lighting of £137. The cost of changing over worked out at £650. After considering these estimates, the Committee has authorised an expenditure not exceeding £650, and has instructed the engineer to carry out the work.

Woolwich.—In connection with the tenders referred to elsewhere for the supply and erection of Diesel oil engines at the Woolwich generating station, it is proposed to install a 1,200-kw. steam turbine at the Plumstead station, in order to meet next winter's load, at an approximate cost of £4,200. The adoption of this turbine and Diesel plant will, the Electricity Committee states, at once lower the cost of generation to ·16d. or ·17d. per unit for fuel, as against nearly ·5d. per unit in 1910, while the turbine itself will allow all the factory load to be dealt with at the Globe Lane Station. By working the stations combined, with oil, it will enable the Council to stock and store reserves which will last almost double the time at present practicable. The Committee had not been able to arrive at final figures, but the following represents approximately the cost of the present proposal:—Water-cooling tower and softening gear, £1,500; buildings, £3,500; foundations, £1,000; switchgear (seven panels), £750; 1,200-kw. turbine, £4,200. The Committee has decided, subject to the necessary sanction being obtained, to invite tenders for the supply of the 1,200-kw. turbine plant for three-phase alternating current.

Bermondsey.—In view of the complaints which have been received as to the poor light given by the present arc lamps in the borough, the Electricity Committee is making trials of various new kinds of arc lamps, with a view to improving such lighting, and a sum of £1,600 has been inserted in next year's estimate in order to cope with the expenditure incurred thereby.

Stepney.—Application is to be made to the L.C.C. for a loan of £5,000 for the provision of plant and machinery at the Limehouse station.

Manchester.—With a view to allaying anxiety, the Corporation Electricity Committee has issued a statement showing that it has accumulated sufficient coal to ensure a full supply of electricity for lighting, power and traction purposes for the next five or six weeks. This should prove a boon to the very numerous power consumers in the Manchester district, and to their many employés.

N. Western Railway Bill.—The Ashton-under-Lyne T.C. is opposing this Bill, while the Luton and Mansfield T.C.'s have decided not to oppose it.

Port Glasgow.—The T.C. has been advised by the Electricity Committee to sanction the proposal of local shipbuilders for securing a supply of current from Greenock Corporation. The shipbuilders offer a guarantee of £1,500 per annum to anyone supplying electricity within Port Glasgow.

St. Helens.—The T.C. has decided to have the Market Hall lit by electricity. Current will be supplied by the Electricity Committee at £70 a year, and the stall holders are to bear the cost of lamp renewals.

Salford.—The Electricity Committee has decided to enter into an agreement with Mark Fletcher & Sons, Ltd., for a supply of energy for power purposes for their works in Pendleton, the company to guarantee a minimum consumption of 25,000 units per quarter, and pay a flat rate of ·8d. net per unit. The Corporation is to allow the company to consume not exceeding 5 per cent. of its power consumption in any one quarter for lighting purposes at the power rate above quoted, the balance of the lighting in one quarter to be charged at 3½d. per B. of T. unit. In the event of the company not taking the guaranteed minimum number of units for power, the balance of the minimum quantity per quarter to be charged at ·8d. per unit net; coal clauses are included, and the agreement is to be for three years. The Committee has further decided to enter an agreement with Messrs. Frankenburg & Sons, Ltd., for the supply to their premises of a minimum of 50,000 units per quarter for all purposes during a period of five years at an all-round charge of ·85d. per unit for the first 37,500 units consumed per quarter, and ·7d. per B. of T. unit for all units consumed over the 37,500. The above-mentioned all-round rate to be allowed on condition that the company use metallic-filament or arc lamps and convert at once all motors larger than 10 H.P. to 440-volt motors.

Skelton and Brotton.—The U.D.C. has provisionally accepted the offer of Messrs. Graham Bros., of Middlesbrough, to light the town with 50-C.P. electric lamps at £2 5s. per lamp from September 1st to April 30th. Hitherto gas has been utilised.

Slough.—Great progress is being made with electric lighting at Slough. In addition to the parish church being connected, the B.G. has decided to utilise current for water pumping, and the U.D.C. has decided to have the sewage station lit by electricity. At the works of Messrs. G. D. Peters & Co., electricity has taken the place of steam plant, while the whole of their establishment is wired for electric lighting.

The L.G.B. has sanctioned the acceptance of the Slough Electric Light Co.'s tender for the workhouse installation, without the Guardians advertising for sealed tenders.

Smethwick.—An unopposed inquiry has been held into the application of the T.C. for a loan of £1,750 for plant necessary for working the refuse destructor plant by electrical power, and for lighting the destructor by electricity.

Thurstonland (near Huddersfield).—At the meeting of the D.C., particulars were submitted as to the probable cost of bringing an electric supply into the village from the mains of the Yorkshire Electric Power Co. at Storthes Hall Lane Bridge. It was decided that further information be obtained for the next meeting.

Westham.—Steps are being taken to form a local company to supply Westham, Pevensey, and, if possible, Pevensey Bay, with electricity. The scheme is put forward by Mr. Von Romer, and a capital of from £2,000 to £3,200 is needed to carry out the project. A sub-Committee of residents has been formed to canvass the district in order to ascertain if the scheme is workable.

Wheatley.—The West Riding of Yorks C.C. and the Yorkshire Electric Power Co., Ltd., have withdrawn their opposition to the application of the Doncaster T.C. for a prov. order for E.L. at Wheatley. The Corporation has agreed to a clause to the effect that no powers obtained shall interfere in any way with the present position of the Power Co.

TRAMWAY and RAILWAY NOTES.

Accrington.—Recently the Court of Appeal decided, in the case of the Metropolitan Electric Tramways, Ltd., *v.* Tottenham D.C., that tramways are rateable as a railway for the purposes of the

general district rate. Mr. Beckett, Accrington borough treasurer, has now tabulated figures showing the effect of this decision, if put into operation, in a reduction of the contribution from the tramways to the general district rate during the next financial year. Whereas in the current year payments by the Tramways Committee to the townships of Church, Oswaldtwistle, Clayton-le-Moors and Accrington amounted to £420, the amount the tramways will have to bear next year under the new scale will be but £149, a reduction of £311.

The Tramways Committee, besides contributing £734 to the relief of rates next year, has decided to make a concession by some reduction in tram fares. Beginning on March 11th, books containing 13 penny tickets are to be issued to the public for 1s., representing a reduction of 7½ per cent.

Blackburn.—The Tramways Committee has decided to recommend the T.C. to increase the wages of the drivers, conductors and car-cleaners by a farthing per hour. No application had been sent in, the proposed advance being spontaneous on the part of the Committee. The advance is equal to an advance of about 1s. 3d. per week, and affects some 140 or 150 men.

Continental Notes.—GERMANY.—Although the tramway system in Berlin is almost entirely in the possession of the Grand Berlin Tramways Co. with a length of over 300 miles of track, there is a smaller undertaking known as the Berlin Electric Tramways Co., which has just concluded a fresh agreement with the Berlin City Council. This circumstance has rendered it necessary for the Berlin Tramways Co. to enter into new relations with the Siemens & Halske Co., which has hitherto been under the obligation to pay to the former the amount of any annual deficiency required to make up the payment of a dividend of 5 per cent. on the tramway share capital. It has now been arranged that in return for a cash payment of £20,000, the Siemens & Halske Co. will renounce its claim to the advances already made under this guarantee, and will also be relieved of the obligations under the guarantee. The firm will still have the right to contract for the supply of materials in so far as its prices are similar to those of other tenderers. The agreement between the tramway company and the city council disposes of all legal doubts as to the company's concession from the State, and is concluded for the period ending with 1939, when the permanent way will pass into the possession of the city free of charge. The right of acquiring the other assets of the company has been settled in a similar manner to that appertaining to the Grand Berlin Tramways Co.

NORWAY.—The proposal is under consideration to build an electric railway from Myrdal, one of the finest situated spots on the Bergen-Christiania railway, through the Flamsdal to the Sognefiord. The electric current will be supplied from one of the State-owned waterfalls.—*Der Elektrotechniker.*

RUSSIA.—Under the auspices of the Banque des Reports et de Fords Publics de Rivers and of the Private Commercial Bank of St. Petersburg there will be formed shortly an electric tramway company for the provision of electric tramways for the suburbs of the Russian capitrl. The new capital will dispose of a capital of 10,000,000 fr.—*La Lumière Electrique.*

FRANCE.—The French Government has introduced a Bill declaring it to be for the public utility to establish in the Department des Côtes-du-Nord of a network of local railways, of a total extent of 356 kilometres. The scheme contemplates the construction of 16 separate railways, and, although the motive power is not stated, the greater majority will probably be electrically operated.—*La Lumière Electrique.*

THE TYROL.—It is proposed to construct a light electric railway between S. Martino d'Olkesceria, Varone and Riva, in the Tyrol.

SPAIN.—La Compania Tranvias de Gijon has lately secured the concession for the construction and working of an electric tramway between La Calzada and Musel.

ITALY.—La Société du Chemin de Fer Electrique du Mont Fredgua et Extensions is the name of a company which has just been formed in Brussels, with a capital of £60,000, to acquire and carry on the Notre Dame de la Garde Electric Tramway at Genoa, at present in liquidation.

SWITZERLAND.—A railless trolley service of public vehicles on the Daimler-Stoll system has lately been put in service between Freiburg and Posieux.

Falkirk.—At a meeting of the T.C., a letter was read from the agent of the Falkirk and District Tramway Co., stating that it was necessary that a plan of the proposed new route of the extension of the company's system to Grangemouth should be submitted to Parliament, and hoping that the T.C. would not object. The Council agreed to the request. When the order was originally projected it was opposed by the Council on the ground that application had been made prior to the expiry of the powers granted by the previous Act. Negotiations followed with the result that opposition was entirely withdrawn.

Glasgow.—The coal strike and the consequent curtailment of the passenger service on the local railways has led to a big increase in the number of persons using the Glasgow Corporation tramway cars. The early morning cars at the commencement of the week were so "rushed" that the service had to be considerably augmented, while the regulation against standing in "double deckers" is being winked at by the authorities. The revenue is being considerably increased in consequence, and on Monday of this week a sum of £230 over that of the corresponding day of last year was drawn. It is reported that the tramway department has sufficient coal on hand to last for three weeks and the electricity department enough for 11 weeks.

In connection with the recent decision to allow blind persons free travelling on the Corporation's tramway cars, the Sub-committee on Finance has been asked to consider as to the question of liability for accidents to blind persons using free passes, and as to the Corporation being indemnified against such accidents.

The Tramways Sub-Committee has remitted to the general manager to report upon the whole question of instituting a half-hourly service of cars, from 12 midnight to 3 a.m., in the city and suburbs.

Haslingden.—An electrical short circuit occurred in a tramway standard at Laneside, Haslingden, on February 28th. The heat generated made the standard red hot, and caused it to bend with its own weight. The tramway manager is of the opinion that the heavy rains started a short circuit, and established a connection between the feeder cable and the pillar, with the result that the cable and the pillar melted until both were clear.

Hastings.—At a recent meeting of the T.C. strong complaint was raised as to the unsatisfactory working of the Dolter system of tramways along the front line of the town. A memorial was received from residents of the Marina, and a resolution from the Ratepayers' Association. The memorialists asserted that "owing to the constant flashing, great noise and dangerous condition of the road," the running of the cars was a great and constant annoyance to visitors and residents; they further considered that many of the large houses on the Marina was vacant through the trams. The gentleman forwarding the memorial (Mr. Richard Stace) declared that if the "serious evil" were not soon remedied "every house will become vacant." In the course of discussion, Councillor Harden suggested a conference with the Tramway Co. and also the Dolter people. It was explained that the matter was already under the consideration of the Roads Committee, and it was resolved to refer the communications to that body.

L. and Y. Railway Electrification.—This company is making further improvements on the electric line which runs from Liverpool to Southport, the particular section to be dealt with being that between Liverpool and Sandhills Station. A statement has appeared in the Liverpool daily papers that important alterations are to be carried out "in order to enable them (the company) to maintain a better service to and from the Exchange Station and Hall Road, Southport and Aintree, which it is hoped will prevent the overcrowding of the electric trains during the busy hours of the morning and evening. It is proposed to electrify the existing steam lines, and thus provide double tracks for the electric trains. The rolling stock used in the steam trains is to be utilised in connection with the electric services, as is the case on Liverpool race days." A representative of the ELECTRICAL REVIEW, on inquiring for particulars of the "important alterations," was informed at the head office of the company that the statement in the daily Press was chiefly remarkable for its inaccuracy. It is quite true that the company is going to lay down the third rail on the eastern lines between Exchange Station and Sandhills, which is the first stopping place outwards from Liverpool.

L. & S.W. Railway Electrification.—According to the daily Press, the South-Western Co. has at last decided to electrify a section of its Thames Valley routes. The first portion of the work to be undertaken is expected to be the lines running from Waterloo *via* Wimbledon to Kingston, and from Kingston *via* Richmond back to Waterloo (known as the Kingston loop lines). The excuse for delay in electrification most favoured by this company's officials has always been lack of terminal accommodation at Waterloo. It is now given out that the terminal reconstruction works have sufficiently progressed to allow matters to proceed, and it is understood that the work will be begun at an early date. Possibly threatened competition may have moved the company at last.

London.—The Central London Railway Co. announces that the various proposals for a westerly extension of its lines in the Thames Valley are still under consideration by the board, but that no definite decision has as yet been arrived at.

One effect of the coal strike has been to induce the Brighton Co. to immediately start its electrical train services between London Bridge and the Crystal Palace, and Victoria *via* Tulse Hill, thus anticipating the programme by three months.

Milnrow.—The final length of the Milnrow tramway extension was inspected by Col. Druitt, of the B. of T., on the 1st inst., when he passed it for immediate service. The total length from Rochdale town centre to Newbery is practically 3·2 miles. In the evening a banquet was held in celebration of the completion of the tramways. Alderman Dunning, of Rochdale, who proposed "Success to the Milnrow district tramways," said Rochdale had now entered into agreements with Norden, Bury, Heywood, Oldham, Royton, Bacup, Whitworth, Littleborough and Milnrow.

Northampton.—According to a statement prepared by the borough accountant, a balance of £5,059 is anticipated to accrue from the tramways undertaking to March 31st, 1912; £1,000 of this sum is to be appropriated to the relief of the rates.

Oldham.—The Tramways Committee has had under consideration a proposal to institute a service between the Moorside terminus and Grain's Bar on the railless trolley system, and the Mayor recently interviewed the B. of T. on the subject. The Committee is taking counsel's advice on the matter, and it has been decided that the general manager shall get out an estimate of

the cost. It is understood that the Corporation electricity department has a three weeks' stock of coal in hand, based on normal working.

South Africa.—The Krugersdorp municipality having declared against the introduction of motor omnibuses, there is a likelihood of an electric tramway scheme being introduced.—*British and South African Export Gazette.*

TELEGRAPH and TELEPHONE NOTES.

State-Owned Cables.—The question of cheap cable communication between Canada and Great Britain continues to attract much attention in the Dominion. The Postmaster-General at Ottawa stated recently that a cheap cable system was the one missing link in the commercial relations between the two countries, and he regretted that Mr. Samuel was unfavourably disposed towards laying a State-owned Atlantic cable.

Telephone Numbers as Telegraphic Addresses.—The P.M.G. has pointed out that telephone numbers can be used as telegraphic addresses, and public notices calling attention to the arrangements and explaining the procedure have been prepared for immediate issue to subscribers and to the Press. The system appears to be regarded by many business men with marked disfavour. Telegrams thus addressed are forwarded by telephone, and this process, it is alleged, destroys all pretensions to secrecy, and may have unfortunate results.

Wireless Telegraphy.—The *Financial News* quotes a rumour that negotiations are under way for the absorption of the United Wireless Telegraph Co. by the Marconi Wireless Telegraph Co., Ltd. The United Wireless is now in the hands of receivers.

A collision occurred between a French mail-boat and a London steamer in the Straits of Dover last Friday, and as the French packets are not equipped with wireless telegraphy, delay was experienced in obtaining help from Dover. All the other cross-Channel boats are equipped.

Interruptions having occurred in the cables between Spain and the Canary Isles and North Africa, the wireless service of the Compania Nacional de Telegrafia sin Hilos (representing the Marconi Co.) has been brought into use to carry on the traffic.

Wireless Telegraphy and Deep-Sea Fishing.—The *Journal Télégraphique* states that the United States Government, with a view to affording protection to fishing boats against sudden storms, has purchased 50,000 receivers for wireless telegraphy, which will be supplied on easy terms to fishermen. The apparatus being adapted for the reception of messages only, the cost is only about £25 each. The number as given above seems excessive; possibly it is a slip for 5,000.

CONTRACTS OPEN and CLOSED.

OPEN.

Aberdare.—March 11th. Electrical goods, for the Powell-Duffryn Steam Coal Co., Ltd., 101, Leadenhall Street, London, E.C. (Form 26). Stores Manager, Aberaman Offices, near Aberdare.

Australia.—Victoria.—March 12th. Testing instruments, for the P.M.G.'s Department, Melbourne. See "Official Notices" January 26th.

March 26th.—Dry cells, for the P.M.G.'s Department, Melbourne. See "Official Notices" February 16th.

April 2nd.—250 plugs, three-conductor, for the P.M.G.'s Department, Melbourne. See "Official Notices" February 23rd.

April 16th.—Magneto table telephones and common-battery wall telephones, and 500 three-position switching keys, for the P.M.G.'s Department, Melbourne. See "Official Notices" March 1st.

April 23rd.—2000-kw. steam turbo-alternator, for the Melbourne City Council. See "Official Notices" March 1st.

Western Australia.—April 3rd. Deputy P.M.G. Four steel towers 40 ft. high, and two steel towers 55 ft. high (Schedule No. 180). High Commissioner in London for the Commonwealth of Australia, 72, Victoria Street, S.W.—*Board of Trade Journal.*

Paper-insulated, lead-covered cable and loading devices (Schedules 184 and 185), for the P.M.G.'s Department, Perth. See "Official Notices" February 23rd.

Belfast.—April 8th. Two 750-kw. turbo-alternators, condensing plant, and E.H.T. switchgear, for the Corporation. See "Official Notices" to-day.

Belgium.—April 1st. La Direction du Service Special d'Etudes et de Controle des Applications de l'Electricité, 52, Boulevard du Regent, Brussels, is inviting tenders for the mechanical and electrical equipment of ten pumping stations in connection with the Charleroi Canal.

Birmingham.—March 12th. Electrical stores, for a year, for the Birmingham, Tame and Rea District Drainage Board. Mr. J. D. Watson, engineer, Tyburn, Birmingham.

Bray.—March 19th. Stores, for the U.D.C. Electricity Works. See "Official Notices" to-day.

Brazil.—April 18th. The General Direction of Public Works at Pernambuco is inviting tenders for the concession for the construction and working of a system of electric tramways in the town.

Brighouse.—March 18th. 1,220 yd. of armoured cable, one feeder pillar and one feeder panel, for the T.C. See "Official Notices" to-day.

Canada.—Calgary.—March 20th. City Commissioners. One 2,500-kw. turbo-generator set, one 1,000-kw. synchronous motor-generator, 50-kw. motor-generator and 25-kw. exciter set. Deposit £500. Particulars can be seen at the Board of Trade Commercial Intelligence Department in London.

March 30th.—One 1,500-kw. A.C. steam turbo-generating set, and one 500-kw. A.C. generator coupled to Diesel engine, for the City Commissioners of Moose Jaw, Saskatchewan. See "Official Notices" to-day.

Saskatoon.—March 22nd. Water-tube boilers, induced draught plant, economisers, automatic stokers, steam feed pumps, one 2,000-kw. steam turbo-generator, turbine exciters, &c. Specification to be seen at the Commercial Intelligence Department, Board of Trade, London. Tenders to City Commissioners, Saskatoon, Saskatchewan. Deposit five per cent.

Carlisle.—March 13th. Lubricating oil, greases, &c., and cables, for the City Electricity Department. See "Official Notices" to-day.

Croydon.—March 11th. Stores for a year, for the Corporation Electricity Department. See "Official Notices" February 16th.

Edmonton.—March 13th. Electrical supplies and lamps, for the B. of G. Mr. F. Shelton, Clerk, White Hart Lane, Tottenham.

France.—Paris.—March 21st. Supply and installation of six groups of electric pumps at the municipal waterworks on the Quai d'Austerlitz. Particulars, Ingenieur-en-chef, Service technique des Eaux et de l'Assainissement, 9, Place de l'Hôtel de Ville, Paris.

Germany.—March 16th. Prussian State Railway Offices at Berlin. Telegraph insulating material, 650 anchor-cramps, 296 050 kg. galvanised iron wire, 8,510 kg. ditto, 11,800 kg. ditto, 79,166 metres telegraph cable, &c.

Gillingham.—March 25th. Materials for a year for the Corporation Electricity Department. See "Official Notices" to-day.

Glasgow.—March 8th. Rotary converters and accessories, for the Corporation Electricity Department. See "Official Notices" March 1st.

Greece.—Volo.—Supply of material for an electric lighting installation. Particulars, M. Glavani, Mayor of Volo.

Hornsey.—March 16th. Extension of dynamo and feeder switchboard, for the T.C. See "Official Notices" March 1st.

Kingston-upon-Hull.—March 26th. Extra-high-tension three-phase switchboard, and 20-ton overhead travelling crane, for the Corporation. See "Official Notices" to-day.

Leeds.—March 9th. 6,000-kw. turbo-alternator, with exciter, condensing plant, piping, &c., for the Corporation. See "Official Notices" February 16th.

Leith.—The Corporation invites alternative tenders for advertising on tramway cars. Manager, 165, Leith Walk.

Liverpool.—March 11th. Electrical fittings for the Select Vestry. G. W. Coster, clerk, Parish Offices, Brownlow Hill.

London.—L.C.C.—March 8th. Electrical installation at the Victoria Embankment Gardens conveniences, Charing Cross. See "Official Notices" February 23rd.

Marylebone.—March 13th. Materials for a year, for the B.C. Electricity Department. See "Official Notices" February 23rd.

Southwark.—March 13th. Cable, for the B.C. Electricity Department. See "Official Notices" March 1st.

L.C.C.—Tenders are to be invited for two new engines for driving the mechanical stokers, coal conveyors, &c., at the Crossness pumping station.

Woolwich.—March 20th. 1,200-kw. three-phase turbo-alternator, with condensing plant, for the B.C. See "Official Notices" to-day.

Manchester.—March 13th. Two 650-800-kw. and one 750-kw. motor converters or rotary converters and static transformers, for the Corporation. See "Official Notices" March 1st.

Merthyr Tydfil.—March 28th. Electrical installation at the Municipal Secondary School, Cyfarthfa Castle. See "Official Notices" to-day.

New Zealand. — May 1st. Public Works Department. Supply to Lyttleton, under the Lake Coleridge electric power scheme, of pipe lines, valves, water-wheels, generators, switchboards, transformers, and accessories, also travelling crane. Particulars can be seen at Board of Trade Com. Int. Dept. in London. Tenders for the whole, or for any section, should be addressed to the Minister of Public Works, Wellington.

Salford.—March 11th. Stores, &c., for a year, for the Corporation Electricity Department. See "Official Notices" February 23rd.

March 21st.—Main D.C. lighting and power switchboard, for the Corporation. See "Official Notices" to-day.

South Africa.—Quantities of electrical and other plant and material will be required by Capetown Municipality if the plans for the proposed new mountain reservoir, about 30 miles distant, are carried out. The scheme includes the installation of a large electrical plant capable of generating current for a number of municipalities, and water purifying apparatus for treating 5,000,000 gallons daily.—*British and South African Export Gazette.*

Spain.—Tenders have just been invited by the municipal authorities of Campofrio (province of Huelva) for the concession for the electric lighting of the town.

Sweden.—March 31st. The Electro-technical Department of the Stockholm Municipality are inviting tenders for the electrical equipment of the water-power generating station at Porjus (Laponie). For further particulars see this column last week.

Swindon.—March 9th. Materials for a year, for the Corporation Electricity and Tramways Department. See "Official Notices" February 23rd.

Taunton.—Single-phase transformers for the T.C. See "Official Notices" February 23rd.

Walthamstow.—March 22nd. Water-tube boilers, feed pump and pipework, turbo-alternators or engine-driven alternators, motor generators, rotary converters and switchgear, for the U.D.C. See "Official Notices" to-day.

West Ham.—March 9th. 5,000-KW. two-phase turbo-alternator, with condensing plant and two-phase E.H.T. switchgear, for the Corporation. See "Official Notices" February 23rd.

Wrexham.—March 15th. Stores, for the Borough Electricity Department. See "Official Notices" February 16th.

CLOSED.

Belfast.—The Tramways Committee has accepted the tender of Messrs. Dick, Kerr & Co. for the construction of tramway extensions in various parts of the city.

Belgium.—The municipal authorities of Ixelles last week opened tenders for the supply of a quantity of armoured cables required in connection with the low-tension electricity supply mains. One French, one Belgian, one Austrian and eight German firms competed for the order, the lowest tender being that of Messrs. Felten & Guilleaume, of Mulheim-am-Rhein.

Brighton.—The Tramways Committee of the T.C. has accepted the following tenders :—

Mr. J. Every.—10 tons of brake blocks, £60.
Burt Boulton & Haywood, Ltd.—100,000 paving blocks, £685.
Hadfield's Steel Foundry Co., Ltd.—Points and crossings, £731.
P. & W. MacLellan, Ltd.—Steel rails, £1,345.
Edgar Allen & Son, Ltd.—Stone crusher, £122.

Bromley (Kent).—The T.C. has received the following tenders for the electric light installation at the library extension :—

R. E. Knight	£87
Bromley Electric Light Co.	74
R. G. Knight	89

Coventry.—The T.C. has accepted the tender of the British Thomson-Houston Co., Ltd., for a turbo-alternator with condensing plant, &c., at £8,639.

Dublin.—At the meeting of the Corporation on Monday, the tender of Messrs. Ferranti, Ltd., for the sub-station switchboard, was accepted.

Eastbourne.—The T.C. has accepted the tender of Messrs. Leyland, Ltd., for two motor 'buses, at £1,500.

Eccles.—The Electricity Committee has purchased the following quantities of slack for the electricity works :—

50 tons, at 13s. 6d. per ton, from the Earl of Ellesmere.
100 tons, at 12s. 6d. per ton, from the Hindley Green Colliery Co.
100 tons, at 12s. 6d. per ton, from Messrs. W. & J. Turner.

Glasgow.—The Electricity Committee has accepted the offers of Messrs. Johnson & Phillips for 30 flame arc lamps, and of the General Electric Co., Ltd., for 170 flame arc lamps for street lighting; and the offer of the North-Western Electrical Appliance Co. for lowering-gear for the lamps.

The offer of Messrs. Johnstone, Park & Co., at £344, for the electric wiring of the new Possil Park Library has been accepted by the T.C. Libraries Committee.

The Tramways Committee recommends acceptance of the offer of Messrs. P. & W. MacLellan, Ltd., for block tin, and that of Messrs. Ferranti, Ltd., for ampere-hour meters.

Grays Thurrock.—The U.D.C. has accepted the tender of Messrs. Venner & Co. for all sizes of Chamberlain & Hookham ordinary and P.P. meters.

Haslingden.—The T.C. has ordered two sets of automatic signals for the tramways from Messrs. Brecknell, Munro & Rodgers.

Horsham.—The U.D.C. has decided to renew the annual contract for meters with the Electrical Apparatus Co., Ltd.

Keighley.—The Tramways Committee has accepted the tender of the Brush Electrical Engineering Co., Ltd., at £425, for the supply and fixing of five new top-deck covers to existing tramcars.

Kingston-on-Thames.—The T.C. has accepted the tender of the Craigpark Electric Cable Co. for 440 yards of '2 concentric paper-insulated lead-sheathed and armoured low-tension cable, at £164.

Leyton.—The U.D.C. has entered into contracts with Messrs. Johnson & Phillips, for a year's supply of 55,000 pairs of arc lamp carbons at £4 10s. per 1,000 pairs, and with the Oliver Arc Lamp, Ltd., for a year's supply of 65,000 pairs at £3 3s. per 1,000 pairs.

London.—L.C.C.—The following tenders were received for the electric lighting of the new engine-house at the Abbey Mills pumping station :—

Foote & Milne, Ltd.	(recommended)	£680
E. Newbald & Co.		692
Pinching & Walton		745
G. E. Taylor & Co.		802
Tredegar & Co.		839
Tilley Bros.		849

Chief Engineer's estimate, £660.

WOOLWICH.—The B.C. has accepted the tender of Messrs. Willans and Robinson, Ltd., for two 400-KW. oil engine sets at £11,459, and that of Messrs. Mirrlees, Bickerton & Day, Ltd., for two 340-KW. oil engine sets, at £9,275.

CITY.—An evening newspaper says that of six tenders received for rewiring for electric light at the Mansion House, exclusive of the Egyptian Hall, the lowest is that of Messrs. Pinching & Walton, at £1,529.

Neath.—The B.G. has accepted the tender of Mr. Wesley Evans, of Skewen, for the electric light installation at the new infirmary, at £950.

Salford.—The T.C. has accepted the tender of Messrs. John Ramsbottom, at £1,075, for extensions to workshops, stores and booster room at the electricity works.

Slough.—The tender of the Felgate Installation Co. has been accepted for the electric light installation at Slough Parish Church.

South Africa.—The tender of Messrs. Arthur Koppel, Ltd., for the supply of poles for the municipal electric lighting installation at Parys, Orange Free State Province, has been accepted; and that of the A.E.G. Electrical Co. of South Africa, Ltd., for the rest of the plant and material.—*British and South African Export Gazette.*

Southampton.—The Electricity Department has recently placed a large order for electric ovens with Mr. Bertram Thomas.

Stoke-on-Trent.—The Joint Hospital Board has accepted the tender of the British Westinghouse Electric Co., Ltd., for an engine, dynamo, &c., at £351; and that of Messrs. H. & T. Danks, Ltd., of Netherton, Dudley, for a boiler, fittings, &c., at £511.

Worcester.—The tender of Messrs. Hardy & Padmore, Ltd., for Rees-Roturbo pumps and Crompton motors, for £982, for the Corporation has been provisionally accepted.

THE ELECTRICAL ENGINEERS
(LONDON DIVISION).

Commanding Officer—Lieut.-Col. H. M. Leaf.

The following orders have been issued for the current week :—

Monday, March 11th.—"A" Company. Technical work and lecture on "Military Telephones," 7 to 10 p.m.
Tuesday, March 12th.—"B" Company. Technical work and lecture on "Military Telephones," 7 to 10 p.m. Recruits' instruction, 7 to 9 p.m.
Thursday, March 14th.—"C" Company. Technical work and lecture on "Military Telephones," 7 to 10 p.m.
Friday, March 15th.—"D" Company. Technical work and lecture on "Military Telephones," 7 to 10 p.m. Recruits' instruction, 7 to 9 p.m.
Saturday, March 16th.—Headquarters will be opened for regimental business from 10 a.m. to 12 noon.

(Signed) P. H. S. Campbell, Capt. R.E. and Adjt.,
For Officer commanding L.E.E.

Manila Electric Railroad and Lighting Corporation.—The directors have declared a dividend of 1½ per cent. ($1.50 per share) for the quarter ending March 31st on the capital stock.

FORTHCOMING EVENTS.

Institution of Mechanical Engineers (Graduates' Association).—Monday, March 11th. At 8 p.m. Paper on "Water Softening and Purification," by Mr. R. D. McGroarty.

Institution of Post Office Electrical Engineers.—Monday, March 11th. At 6 p.m. At the I.E.E. Paper on "Telegraph History," by Mr. H. R. Kempe.

Institution of Electrical Engineers (Newcastle Local Section).—Monday, March 11th. At 7.30 p.m. At the Armstrong College, Newcastle. Paper by Mr. W. W. Firth on "Flashing Over in Commutator Machines," and Mr. J. W. Jackson on "Power-Station Running."

Institution of Electrical Engineers (Manchester Local Section).—Tuesday, March 12th. At 7.30 p.m. At the University, Manchester. Paper on "High-Tension Porcelain Line Insulators," by Mr. J. Lustgarten.

Institution of Electrical Engineers (Scottish Local Section).—Tuesday, March 12th. Meeting at 8 p.m. At 207, Bath Street, Glasgow.

Junior Institution of Engineers.—Tuesday, March 12th. At 8 p.m. At the I.E.E. Paper on "Railless Electric Traction," by Mr. B. D. Fox.

Friday, March 15th.—At 8.15 p.m. At 39, Victoria Street, S.W. Paper on "Crude-Oil Engines," by Mr. A. H. Weston.

Saturday, March 16th.—At 10 a.m. Visit to the Lot's Road power station, Chelsea.

Institution of Civil Engineers.—Tuesday, March 12th. At 8 p.m. Papers on "Roller and Ball Bearings" and "The Testing of Anti-Friction Metals" to be further discussed.

Friday, March 15th.—Students' meeting. At 8 p.m. Paper on "The Heat Value of Fuels," by Mr. A. E. Gladwin.

Institution of Electrical Engineers (Yorkshire Local Section).—Wednesday, March 13th. At 7.30 p.m. At the University, Leeds. Lecture on "Telegraphs and Telephones," by Major W. A. J. O'Meara.

Association of Engineers-in-Charge.—Wednesday, March 13th. At 8 p.m. At St. Bride's Institute, London, E.C. Paper on "Transmission of Power by Ropes," by Mr. E. E. Hart.

Institution of Electrical Engineers (Dublin Local Section).—Thursday, March 14th. Meeting at 8 p.m. At the New Royal College of Science, Dublin.

Royal Institution.—Friday, March 15th. At 9 p.m. Discourse on "The Origin of Radium," by Mr. F. Soddy.

Saturday, March 16th.—At 3 p.m. Lecture on "Molecular Physics," by Prof. Sir J. J. Thomson. (Lecture IV.)

Institution of Mechanical Engineers.—Friday, March 15th. At 8 p.m. Paper on "The Diesel Oil Engine, and its Industrial Importance, particularly for Great Britain," by Dr. R. Diesel.

South-Western Polytechnic.—Friday, March 15th. At 8 p.m. Distribution of prizes and certificates by Sir D. Gill.

Northampton Institute Engineering Society.—Saturday, March 16th (not March 9th, as stated in our last issue). At 7 p.m. for 7.30 p.m. At the Holborn Restaurant. Annual dinner.

Institution of Electrical Engineers (Students' Section).—Saturday, March 16th. At 7 p.m. At the Trocadero Restaurant. Eighth annual dinner.

NOTES.

Inquiry.—The address of makers of the new insulating material, "Seagumite," is asked for.

The Importance of Exhibitions.—Mr. Chas. Knott, British representative at the proposed International Exhibition at Ghent next year, attended a meeting of the Burnley Chamber of Commerce on February 29th. He characterised the Exhibition as the battle-ground of commerce, and said that in her own interests Britain should be well represented there. Britain had given way to Continental rivals simply because she had been content to stay as she was. In this particular instance she was the only country to stand aloof. It was necessary that British manufacturers and engineers of every class should wake up to a sense of the importance of this class of exhibition. Alderman Keighley, the Mayor, moved a resolution that it was high time that steps were taken by the Board of Trade to ensure British representation worthy of her arts and manufactures at the Ghent Exhibition. As an exhibitor at Brussels, he was dissatisfied with the way in which the Board of Trade carried on that exhibition. Mr. T. Crook seconded, and said that if the Board of Trade took the matter up, British manufacturers would enthusiastically follow their lead. The resolution was carried.

Rural and Domestic Applications of Electricity.—A policy much adopted abroad is to install rural central stations for the purpose of supplying a number of farms, rural industries, country residences and estates with electricity. By establishing a rural central station, driven by either steam, water, gas or oil, a great saving in the cost of production of electrical energy may often be easily secured.

In Germany, Northern Italy and throughout Switzerland, there is an extended use of electrical energy in agricultural communities. A network of distributing lines has been formed, owing to the scattered and numerous sources of hydro-electric power.

As an example of the extent to which a single rural central station may supply a farming community, the rural station of Besswitz may be cited. The distribution system is 145 miles long, the central station being as nearly as possible at the centre of the network; the greatest distance of supply from the station is 26 miles. The territory served, according to the American *Electrical Review and Western Electrician*, is 102,000 acres in extent, of which 40,000 acres are cultivated with the plough. To this network are connected 180 motors and 5,000 lamps, with a total consumption of 1,300 KW.

The energy is sold on a sliding-scale basis; 3d. per KW.-hour is charged for lighting purposes, and for power the rate varies from 1½d to 2d., depending, of course, on the quantity consumed.

Many of the German farmers have rural industries connected with their farms, whereby they utilise their by-products, and herein lies the secret of the success of many well-to-do farmers. For example, on one of these installations there are connected four grist mills, with five motors, aggregating 105 H.P.; one tile works, with a 40-H.P. motor; one sawmill, with a 20 H.P. motor, and so on. There are also connected 20 consumers for lighting only, with a total of 343 incandescent lamps and six arc lamps.

From the above facts and figures, it will be seen that electricity can give a new stimulus to agriculture and farming, and at the same time open up a way by which the rural population can be induced to remain on the farm instead of flocking to overcrowded cities and taking up an entirely new form of work, in order to earn a living.

Electrical energy is distributed on both high-tension alternating-current and low-tension direct-current systems. Hard and fast rules cannot, of course, be laid down as to the use of either. In making comparisons, however, the following points should be remembered: In D.C. transmission the line construction is of a very simple and reliable character, and of comparatively low cost. Also, direct-current motors have a slightly higher efficiency, and will, in general, carry larger temporary overloads. The direct-current system should not, however, be used for long distances, as the pressure cannot be transformed without the use of rotating transformers. The latter are, of course, more expensive than the transformers used in connection with alternating-current systems.

In many cases energy is required in a certain section of the field for a short time only, and permanently to install a transformer on A.C. systems would often be bad policy. To fill such an emergency a portable transformer is used. It is mounted on wheels, and can be drawn by a pair of horses. It can be placed in position when required, and returned to the barn when the work is done. This plan has the advantage that a number of farmers can own such a transformer in common, and thereby save a considerable amount in first cost.

Coal Strike Effects.—The Foster Engineering Co., Ltd., of Wimbledon, write as follows:—"The paragraph in certain newspapers, published on Saturday, stating that 'we have been notified that the supply of electricity from the local works cannot be guaranteed from day to day,' is quite unauthorised by us, and is, in any case, absolutely without foundation. We have received no such notification, and we are quite satisfied that the precautions taken by the engineer, Mr. H. Tomlinson-Lee, are ample to see us through the coal strike as far as power goes."

The *Times* reports:—"The strike will not have any appreciable effect for some time upon the gas and electricity works which supply London with light and power. Large reserves of coal are available, and therefore it is not anticipated that for some weeks even with the probable increased demand there will be any necessity to curtail the supply. Electric tramcar services throughout Greater London will be maintained fully, and the only indication to the general public of economy in fuel will be that in the tramcars of the Middlesex County Council the electric lamps will be lighted at a later hour than usual."

In one of its articles on the injurious effect of the strike upon trade, our contemporary, on February 28th, referring to the position of works at Woolwich, gave the following as the periods for which coal was stored by firms well known to our readers:—Callender's Co., three or four weeks; Henley's Co., three weeks; Siemens & Bros. Co., two weeks; Western Electric Co., eight weeks.

The *Times* also says that the Liverpool Exhibition, which was to have been opened in May, has been postponed for 12 months on account of the coal strike. "The directors received notices from railway companies and the contractors concerned to the effect that they cannot guarantee delivery at the time specified, and the directors are therefore compelled to make the postponement."

Electrical Trades Union.—At the Bush Hotel, Shepherd's Bush Green, W., a lecture will be delivered on Tuesday, March 12th, at 9 p.m., by Mr. A. A. Watts, on "Socialist Action in Local and National Administration."

Parliamentary.—In the House of Lords on Monday, the following Private Bills were read a second time:—The Brighton District Tramways Bill, the Brighton, Hove and District Railless Traction Bill, and the Wirrall Railway (Extension of Time) Bill.

A Novel Use of the Electric Arc.—A recent paper on "The East River Tunnels of New York," by Mr. Henry Japp, gives some particulars of special electrical-melting work, which are of great interest. Where the tunnel shields met below the river it was necessary to cut them in pieces, leaving only their external shells, within which were then placed the final tunnel rings of cast-iron. The pressure of the air in which work had to be done was high, and labour is severe under these high pressures. It was, therefore, decided to employ electricity and burn the shields apart.

The current for this work was taken from the power house of Long Island City. The burning circuit was taken from the positive terminal through a water resistance built up of four barrels in parallel, with plates 18 in. × 14 in. × ¼ in. With this the pressure was cut down to 50 or 60 volts at the burning tool, and the current was regulated to the work or number of tools in operation. The current then passed to earth plates in the river, having a total area of 48 sq. ft. From the negative terminal a cable ran direct to the shields of Tunnels D and B, with connections to Tunnels A and C through a small pipe driven between the tunnels. There are four lines of tunnel. The burning tool was a

carbon rod 1 ft. in length and 1 in. in diameter, bolted to a copper rod which was connected to a cable leading from the generator to a single-pole switch near the shields. There was an insulated handle with a 12-in. diameter shield of asbestos, and each man had also an asbestos mask, apron and dark eye-glasses.

Rivet heads were burned off with a current of 250 to 400 amperes per tool. This served also for light section plates. Floors and uprights about 4 in. thick required 600 to 800 amperes. The arc was from ½ in. to 3 in. long, and the best results were secured with about 40 volts and 600 amperes. A fair duty for 8 hours was 300 rivet heads, but as many as 530 were removed on one occasion. A specially expert man cut a 54 in. × 4 in. upright in 8 hours. The arc was so bright that several men were blinded at some distance, the blindness coming on a few hours after looking at the arc, and being accompanied by violent headache. The blindness was temporary.

The iron gave off dense fumes, which were mostly removed promptly by a foul-air blow-out pipe suspended near by. Still, much fume escaped into the tunnels and made it difficult to see to walk with the aid of a candle. But in this foul air no cases of "bends" occurred, though the air pressure was 29 lb. There was, however, no specially high CO_2 record. It appears that high CO_2 is the indicating cause of "bends," but it seems probable that high CO_2 is, perhaps, only the indicator of high organic impurity, and the latter may be an influence in producing "bends."

Institution and Lecture Notes.—Physical Society.—At the meeting on February 23rd a paper on "A Balance Method for the Accurate Comparison of Quantities of Radium and Some of its Applications," by Prof. E. Rutherford and Mr. J. Chadwick, and one on "The Absorption of γ-rays by Gases and Light Substances," by Mr. J. Chadwick, were read by Prof. Rutherford. A paper on "Wave-form Sifters for Alternating Currents" was read by Mr. A. Campbell. If an alternating current of complex wave form be passed through a condenser (K) and the primary coil of a mutual inductance (M) in series with it, any other circuit connected across the condenser and the secondary coil (in series) will receive no component of the current of frequency n if $\omega^2 M K = 1$, where $\omega = 2\pi n$. This arrangement affords a means of totally suppressing the fundamental or any single harmonic in a complex wave form.

Institution of Electrical Engineers (Students' Section).—The annual dinner of the Students' Section will be held at the Trocadero on Saturday, March 16th, at 7.30 p.m. The President of the Institution and several members of Council have signified their intention of being present. Tickets (price 6s. each) for student members and their friends can be obtained from Mr. J. Mould, 20, The Drive, Golder's Green, N.W.

Royal Institution.—At a general monthly meeting of the members, the special thanks of the members were returned to Mr. J. C. Simpson for his present of an original letter from Mr. Riebau, the bookbinder to whom Faraday was apprenticed, giving some account of Faraday's early life.

Society of Engineers (Incorporated).—A paper on "The Trolley Vehicle System of Railless Traction" was read recently by Mr. Henry C. Adams, who stated that the total capital cost of the system was approximately £3,000 per mile of route, compared with about £10,000 per mile for electric tramways. The cost of the overhead work might be taken at from £1,250 to £1,500 per mile. The vehicles cost £700 each. The cost of obtaining Parliamentary powers might vary from £400 to £5,000, dependent upon the amount of opposition. Reasonable periods to allow for repayment of the cost of installation would be: For the Bill, 5 years; vehicles, 10 to 15 years; overhead equipment, 20 to 30 years; cables, 40 years. The cost of working was about 5½d. per car-mile. The receipts depended entirely upon local conditions; they varied abroad from 5·6d. to 10·75d. per car-mile; at Leeds they had been 10·75d and at Bradford 8·25d. per car-mile, all of which figures showed a handsome profit. Trailer cars were attached to the omnibuses abroad, but it was doubtful whether they would be permitted in this country. Tire companies were willing to maintain the tires on trolley omnibuses at from 1d. per car-mile, dependent to some extent upon the condition of the roads. Tires had been run for 28,000 and 24,000 miles respectively on trolley omnibuses abroad. Attempts had been made to obtain payment for the use of the roads, but, in the Aberdare Bill, both Houses of Parliament declined to insert a clause requiring payment.

Institution of Electrical Engineers (Western Local Section).—On Monday last the inaugural meeting of the new Western Section was held at the Merchant Venturers' Technical College, Bristol. There was a good attendance of local members of the I.E.E., and the President, Mr. S. Z. de Ferranti, was present, with Mr. J. E. Kingsbury and Mr. P. F. Rowell representing headquarters. After a brief welcome from Prof. J. Wertheimer, Dean of the Faculty of Engineering of the University of Bristol, on behalf of the University authorities, Mr. Ferranti thanked the Faculty, and proceeded to explain that the success of the existing Local Sections had led to the formation of the new one, which had been effected mainly by the efforts of Mr. W. A. Chamen and Mr. H. Faraday Proctor. The Western Section would cover practically all the West Country not already covered from Manchester, Birmingham and London, and in view of the great developments of the electrical industry in that region, there ought to be ample material for discussion at the meetings. Mr. Proctor then proposed that Mr. Chamen, the first to suggest the formation of the Section, should be elected the first chairman, and this motion, seconded by Mr. Sydney F. Walker, was carried unanimously, with acclamation.

Mr. Chamen, having returned thanks for his election, explained the peculiar difficulties which had been experienced in organising the Section, due to the scattered area to be dealt with, and the fact that, though there were many electrical engineers in South Wales, an unduly small proportion of them were members of the Institution, owing to the impossibility of attending meetings, and otherwise sharing in its benefits. He believed that the establishment of the new Section would bring in many new members, and would thus be to the advantage of the Institution as a whole. The title of "Western Local Section" was adopted after much deliberation as the most appropriate to the circumstances, and the meetings would be held not only at Bristol and Cardiff, but also at other important towns if necessary, so as to meet the needs of all.

Mr. H. Faraday Proctor was then unanimously elected vice-chairman, and Messrs. W. Collins and S. H. Haslam were elected joint hon. secretaries—the former in Bristol, the latter at Cardiff; a Committee of 15 members was also appointed, viz.: Messrs. S. F. Walker, J. H. Bolam, L. A. Hards, H. J. F. Stewart, F. H. Corson, H. T. Sulley, J. H. Edwards, J. H. St. Hill Mawdsley, H. Collings Bishop, H. D. W. Lewis, D. E. Roberts, A. Sinclair, R. Rutherford, and Arthur Ellis.

For the day of meeting, Monday was adopted *pro tem.*, and it was proposed that the members should dine together before the meeting. The by-laws were referred to the Committee. Votes of thanks were accorded, to the University authorities, who had promised to provide free accommodation for the Bristol meetings, and to the South Wales Institute of Engineers for accommodation at Cardiff.

The occasion was celebrated by a dinner at the Royal Hotel, at which about 100 were present. After the loyal toasts, Mr Alderman Pearson proposed "The Institution of Electrical Engineers," expressing the gratitude of the Council of the I.M.E.A. for hospitality in their magnificent building, and the hope that the new by-laws would provide more funds and enable the Institution to continue the good work it was doing. He had known the President for 20 years, and graphically described his first meeting with him at Deptford, at which he was so impressed with Mr. Ferranti's enthusiasm and confidence in the future of electricity that he had never wavered in his support of the electricity supply undertaking of the Corporation of Bristol.

Mr. Ferranti expressed his interest in Alderman Pearson's reminiscences, and described the sucessive changes which had come over the Institution and its proceedings. Formerly there was a constant flow of new inventions and ideas, but nowadays the supply of electricity had attained to a commonplace level of reliability; it was, therefore, no longer practicable for the Institution to maintain its position as a purely scientific society. It should look after all things electrical and the interests of all electrical men; it was, therefore, necessary to broaden the basis of membership and take in all the people whose life-work was electrical. They must have a very large membership in order to be very strong and able to help in all electrical matters. They were celebrating the birth of a new Section, a most auspicious occasion, by means of which they hoped to bring the Institution home to the Western members, and to increase the membership, and he was pleased to have had the honour and privilege of assisting at the inception of the Western Local Section.

Mr. J. E. Kingsbury proposed "The Western Local Section," which title he said he would supplement by the words "Of the Institution of Electrical Engineers"; for he wished to point out that though the I.E.E. began as a society of very small things, its constitution had been so wisely drawn that it had been able to cover the ever-expanding field of electrical industry, and would continue to maintain its position in the future. The science had by no means reached finality; there would be as great developments in the future as in the past. The Institution had one great source of strength that other similar societies did not possess—namely, its Local Sections—each of which should remember that it formed only a small part of the greater body, and should thresh out its difficulties for the sake of its fellows. The Western Section, for example, might well attack the problems of electricity in mining, to the advantage of all branches of the Institution. Being a Western man himself, he felt great satisfaction in attending at the birth of the Western Section, and he had never seen a more lusty offspring or a better set of officers. Mr. Chamen, in responding, first thanked the President for his presence at the inauguration of the new Section, and then explained the circumstances attending the choice of name, the proposed arrangements for meeting at various centres, &c. He thanked the members for electing him as the first chairman, and claimed their hearty co-operation with him in that office.

The chairman then proposed the health of Mr. H. Faraday Proctor, who had done all the hard work; he referred to the events of two years ago, when the newspapers censured their proceedings, but he said that Mr. Kingsbury had been with them from the first, and he thanked him for his kindly interest in the new Section. The toast was accorded musical honours, and Mr. Proctor responded, expressing his indebtedness to the hon. secretaries, Messrs. Collins and Haslam, who had worked very hard and interviewed most of the members within the area, with most satisfactory results. He emphasised the difficulties peculiar to the Section, as well as the importance of calling it into existence for the sake of both the members and the membership. Personally he attached greater value to the benefits of the social side than to the reading of papers.

Mr. D. Roberts proposed "The Visitors," and Dr Wertheimer replied. Mr. Martin Price, secretary of the South Wales Institute of Engineers, was also to have replied, but owing to the vagaries of the local train service was unable to be present.

An excellent programme of music and song was interspersed with the speeches, and special mention should be made of the accomplished performance of Mr. F. Gardner, a violin virtuoso, well-known in Bristol.

On Wednesday last week, a lecture was given by Mr. Charles Bright, F.R.S.E., at Caxton Hall, Westminster, on the subject of "Inter-Imperial Cable Communications: A Non-Party Question." The lecturer empha-ised the importance of cheap cable communication between all parts of the Empire, as a means of developing Imperial trade and circulating news. Everyone of the 13 cables between the United Kingdom and Canada was to-day under American control, and this offered serious possibilities in the future; provision should be made for the exchange of communications with Canada outside American influence. It was only by State aid and State control that the situation could be saved; a low tariff throughout the Empire could then be established. A universal penny-a-word tariff was impracticable, but he foreshadowed a common Imperial tariff of 6d. a word.

Appointments Vacant.—Engineer-in-charge for the Sunderland Corporation Electricity Works (50s.); electrical engineer for the Newport Corporation Electricity and Tramways undertaking (£400); fitter-driver for the Cleckheaton U.D.C. Electricity Works; engineering and mechanical draughtsman for the Stoke-on-Trent Corporation Electricity Department (£104); full-time assistant in the Electro-Chemistry Department, Northampton Polytechnic Institute (£120). See our advertisement pages to-day.

A Claim for "Open-Contract" Work.—On Wednesday last week, at the Guildhall, before Ald. Sir V. Morgan, Bart., an action was brought by F. E. Brown, a mechanic lately employed by Mr. H. W. Sullivan, against the latter in respect of a claim for a sum of £5 19s. 1½d., which was alleged to be due to plaintiff whilst in his employ. The plaintiff, who conducted his own case, sought to establish his claim on the grounds of an alleged unconditional promise made to him by Mr. Sullivan's late manager, alleged custom of the trade, and usage in the defendant's factory. The defendant was represented by Mr. W. Shakespeare. It transpired, in the course of evidence, that the work in dispute was to detailed drawings and specification, and not experimental work; nevertheless, the plaintiff contended that, on the above-mentioned grounds, he was entitled to be paid at the rate of 1s. an hour.

Mr. Sullivan's late manager, his present manager, and a number of his present employés, as well as a member of the executive of the Scientific Instrument-Makers' Trade Society, were called as witnesses by the plaintiff. The late manager denied the alleged promise, and the magistrate dismissed the case without calling upon the defendant for evidence, on the ground of failure to establish any of the bases of the plaintiff's claims. The defendant waived the question of costs.

An important principle was involved in this case—namely, that an employé should not be able to insist on special payments over and above the trade-union rate of wages unless his work met with the approval of the employer. Had the plaintiff succeeded in establishing his case, it would have constituted a precedent for raising the wages above the trade-union limit on "open-contract" work, without regard to the results achieved or the length of time expended on the job.

Quantitative Investigations on Wireless Telegraphy over Long Distances.—L. W. Austin, writing in the *Physikalische Zeitschrift*, details the final results of the investigations undertaken in 1909 and 1910 between the Brant Rock station and the cruisers *Birmingham* and *Salem*, with a view to ascertaining the relationship between the current strength in the receiving and transmitting aerials with various long distances between the latter. On account of the indefinite variations observed during night trials, only measurements taken when the whole distance traversed by signals is under full daylight can be given any quantitative importance. Even by day, the absorption of æther waves varies greatly with the season, and is considerably less in winter than in summer.

Investigations with 1,000-m., 1,500-m. and 3,750-m. waves confirmed the result already adduced by Duddell and Taylor, that the intensity of waves transmitted oversea diminishes in direct proportion to the distance. Observations were made over various distances up to 1,000 nauts between the two cruisers and up to 1,200 nauts between Brant Rock and the *Birmingham*. Apart, however, from the decrease in intensity of reception with increasing distance of transmission, there was observed a further absorption depending upon the wave-length employed and also affected by the distance of transmission. It was found that the strength I of the receiving aerial current, when transmitting waves of length l over a distance d was given by—

$$I = \frac{h}{d}\, l^{-Ad}$$

where A and h are constants determined by experiment.

Further, taking into account the heights h_1, h_2 of the sending and receiving antennæ, and denoting by I_S the current in the sending aerial, and by λ the wave length, the receiving aerial current I is given by:—

$$I = 4{\cdot}25\, \frac{I_S \cdot h_1 \cdot h_2}{\lambda \cdot d}\, l^{-\frac{0{\cdot}0015\, d}{\sqrt{\lambda}}}$$

(I and I_S in amperes; length in kilometres).

Whence it appears that, so long as the resistance of the antennæ remains constant, the intensity of reception is directly proportional to the product of the heights of the aerials, and inversely proportional to the wave length.

Social Events.—The Sixth Annual Staff Ball of the Electric and Ordnance Accessories Co., Ltd., took place on Friday last at the Imperial Hotel, Birmingham. Some 120 members of the staff were present, with their wives, sisters and other friends, and an enjoyable time was spent from 8 p.m. until 2 a.m. Everybody was grateful to the M.C. (Mr. W. H. Waller) and stewards (Messrs. W. Corrie and C. Brittlebank) for the able manner in which they performed their duties. The ball is stated to have been the most successful ever held by the staff.

On Saturday, 2nd inst., the second annual dinner and smoking concert of the London Electric Power House, Lot's Road, Sick Benefit Club was held in the Pier Hotel, Chelsea, a large number being present under the chairmanship of Mr. J. W. Towle, the chief engineer; Mr. J. H. Millen, station superintendent; and Mr. P. R. Wray, sub-station superintendent, were also present. After the loyal toasts were given, the success of the club was proposed by leading stoker O'Keefe, and seconded by Mr. O'Reilly, who spoke of the past and present success of the club. A successful musical programme was given by the employés, helped by outside artistes, under the management of Mr. Bert Folgate. A few words of thanks to the chairman for his support by Mr. J. Gough, of the boiler house, closed the proceedings.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station Officials.—The Electricity Supply Committee of the Stoke-on-Trent T.C. has granted the following increases of salary:—MR. C. H. YEAMAN, Borough electrical engineer, from £500 to £700 maximum, by £50 per annum; MR. H. W. EDWARDS, resident engineer at Burslem, from £180 to £185; MR. W. A. TURNBULL, resident assistant engineer at Stoke, from £180 to £185; MR. S. G. MARSTON, mains superintendent at Hanley, from £140 to £145; MR. D. C. REDFERN, mains superintendent at Stoke, from £130 to £135, subject to acting as mains superintendent in the Longton and Fenton areas. Increases have also been granted to numerous subordinate members of the staff.

MR. J. E. STAMP has been appointed a temporary assistant at the Barrow Corporation electricity works.

MR. GEO. OLLIER, of the Blackpool Electricity Works, has been appointed assistant electrical engineer, by the Bispham-with-Norbreck U.D.C.

The Elland U.D.C. has appointed MR. W. C. KNOWLES, assistant engineer at the Cleckheaton Electricity Works, as electrical engineer, at a salary of £150 per annum. There were 180 applicants.

On leaving to become chief assistant electrical engineer at Erith, MR. R. H. MAYNE has been presented by the electricity staff at St. Helens, with a dispatch case and a number of technical books.

The Derby T.C. has appointed MR. G. DARDEN, as assistant mains superintendent.

On Thursday last week at the St Helens Corporation electric power station, MR. F. J. HELSBY was presented with a suit case, on the occasion of his leaving to take up the position of chief clerk at the Wrexham electricity works.

On Wednesday evening, March 6th, MR. M. R. MCCRACKEN, assistant shift engineer of the Lot's Road power house, was presented by Mr. J. W. Towle, chief engineer, on behalf of the operating staff, with a silver-plated tea service and tray on the occasion of his marriage.

Tramway Officials.—MR. N. J. YOUNG, of the Bristol Tramways and Carriage Co., Ltd., who has been appointed manager to the Newport (Mon.) Tramways and Electricity Undertakings, has been presented by his colleagues with a silver fish service.

General.—At a meeting of the Senate of the University of London recently, MR. E. KILBURN SCOTT was officially recognised as a teacher of Electrical Engineering at University College for students proceeding to the B.Sc. degree. Mr. Scott had already been "recogni-ed" by the University for Electrical Design at the Northampton Institute, London, where he has been on the teaching staff since 1898, except for four years spent at the University of Sydney. Mr. Kilburn Scott has also given special courses of lectures this session at Finsbury Technical College and the Polytechnic, Regent Street.

MR. G. F. METZGER announces that he has changed his address from Manchester to Shepherdswell, near Dover, and all communications should be addressed there until further notice.

MR. H. J. ALEXANDER, who has held the position of chief rate fixer at the Electric and Ordnance Co.'s works at Aston for the past 10 years, has just left in order to take up an important position in Manchester. His colleagues, in order to show their appreciation of his abilities, both in the works and outside, organised a smoking concert at the Central Restaurant, Corporation Street, Birmingham, on the evening of March 1st, and during an interval in the programme they presented him with a gold half-hunter, suitably inscribed. A good muster of his friends both past and present were in attendance, and in making the presentation the chairman wished him every success in his new sphere. The programme was an extremely good one; especially do we understand that to have been the case regarding one turn given by a member of the motor design staff, which consisted of topical allusions to idiosyncrasies to be noticed in the E. and O. A. Works.

We understand that Mr. Oswald Dewey, who has been with the Reason Manufacturing Co., Ltd., for the last six years, is joining the Isaris-Zaehlerwerke, of München, as their sales engineer for the British Isles. Prior to joining the Reason Co., Mr. Dewey held the position of chief salesman in the meter department of Messrs. Ferranti, Ltd., Hollinwood.

The subject of a sketch under "Men of the Day," in *Mayfair* (February 29th) is Mr. George Balfour, of Balfour, Beatty & Co., Ltd., who is interested in various electrical enterprises, and has figured in recent years in the world of politics. Mr Balfour is only 40 years of age. He was an assistant in the Edinburgh Corporation electricity works at the time of their opening some 17 years ago, and since then he has had experience of power station, tramway and other electrical and financial affairs.

Obituary.—Colonel G. E. Gouraud.—The death of Col. Gouraud, which we recorded in our last issue, removes from the scene one of the pioneers of electrical enterprise. His connection with the introduction of the phonograph and his association with the "Emperor of the Sahara" have been referred to in the obituary notices published in our daily contemporaries, but Colonel Gouraud's memory requires that his work in connection with the telephone and the electric light should be recalled. He was the London representative of the Mercantile Trust Co., of New York, when the telephone was first heard of. Having previously some relations with Edison in connection with automatic telegraphs, he obtained an interest in his European telephone rights and carried on the active management of the business. He formed the Edison Telephone Co. in London, and the first exchange on the Edison system was in his office, which was also the Mecca of the representatives of the Press seeking information regarding the new system of distribution and sub-division of the electric light which was to revolutionise the world's lighting. There were not wanting critics who suggested that the trans-Atlantic telegrams had a Stock Exchange purpose, for the fall in gas shares was serious. But such suggestions were entirely unfounded. The telephone enterprise had been launched when the "perfected phonograph" was introduced. The interest in this was great, and there would have been no difficulty in enlisting considerable public capital in it, but the formation of a company for its commercial exploitation was delayed. Social success was a great aim of the Colonel, and the phonograph was used to that end until public interest was on the wane. Invitations were issued to "At Homes" "to meet Mr. Edison," which meant to hear Mr. Edison's voice on the phonograph. Colonel Gouraud was one of the "Celebrities at Home" of *The World* (October 17th, 1888). In the well-known style of those articles, the Colonel's house, horses and ambitions are set forth:—"On the crest of Beulah Hill, midway between the Crystal Palace and Streatham Common, you come somewhat abruptly on an archway of moulded terra-cotta. The letter G is interwoven with a sabre, a pen and flashes of lightning, on a shield in the centre of the pediment, and through the gate of hammered ironwork you catch a glimpse of a view of surpassing beauty . . . . . If he had only known of your visit, telephone and phonograph, the fastest going tandem in England, would have brought you from Herne Hill in less than half the time it took the train to reach the High Level Station. . . . . When the exigencies of business caused his sojourn in England to be indefinitely prolonged, he pitched his tent on Beulah Hill, resolved to send his sons to Harrow, and settled down quietly to the full enjoyment of English life." But "Little Menlo" was, in later years, to have other occupants, for the enthusiasm and other admirable qualifications which were of great advantage in the inception of an enterprise did not enable him to work with others to its successful accomplishment. He was a man of kindly thought and good ideas which could, with advantage, be left to others to carry out. But the enthusiast and the *visionnaire* sometimes find it difficult to keep in touch with practical questions, and before long he ceased to be connected with the valuable enterprises which he helped to start. His connection with M. Lebaudy as Postmaster-General, or some such office, of the Empire of Sahara, is to be regretted, but may be charitably considered as a development of some mental bias which found early expression in his use of the phonograph for the purpose of social success. The device over the Beulah Hill gateway was characteristic of the man. The "G" was necessarily the centrepiece; of the sabre and his right to wear it he was proud; of the pen he could make good use, and flashes of lightning were by no means infrequent. Though much misunderstood by his contemporaries, he was a pioneer who did some good and useful work, and amongst his early associates there are those who acknowledge indebtedness to him for beneficial influence, and of him retain kindly memories.

NEW COMPANIES REGISTERED.

John C. Fuller & Son, Ltd. (120,563).—This company was registered on February 29th, with a capital of £10,000 in £1 shares, to take over the business of an electrical and general engineer, recently carried on by G. Fuller as "John C. Fuller & Son," at Woodland Works, Wick Road, Old Ford, E., and to adopt an agreement with G. Fuller. The subscribers (with one share each) are:—G. Fuller, Elm Croft, Hutton, Essex, electrical engineer; G. J. A. Fuller, Badwell Cottage, Draycot Road, Wanstead, Essex, electrical engineer. Private company. The number of directors is not to be less than two or more than seven; the first are G. Fuller, G. J. A. Fuller and L. Fuller; qualification, £1,000; remuneration of chairman, £1,000 per annum; of others, £240 each per annum. Registered by Tarry, Sherlock and King, 17, Serjeant's Inn, E.C.

Fletcher's Electric Fittings, Ltd. (120,514).—This company was registered on February 27th, with a capital of £1,000 in £1 shares, to take over the business of an art metal worker and gas and electric fittings manufacturer, lately carried on by E. Fletcher at 59, Key Hill, Birmingham. The subscribers (with five shares each) are:—E. Fletcher, 124, Hampstead Road, Handsworth, Birmingham, manufacturer; A. R. Page, 59, Woodfield Road, King's Heath, Birmingham, manufacturer; S. E. Hill, 41, Cambridge Road, King's Heath, Birmingham, manufacturer. Private company. The number of directors is not to be more than five; the first are E. Fletcher, A. R. Page, and S. E. Hill; qualification five shares. Registered by Jordan & Sons, Ltd., 116-117, Chancery Lane, W.C.

Titan Lift Co., Ltd. (120,405).—This company was registered on February 21st, with a capital of £2,000 in £1 shares, to carry on the business of manufacturers of lifts, hoisting appliances and electric machines, electrical engineers and contractors, and to acquire the business of the Titan Lift and Electric Co. in London, and to adopt agreements (1) with the Titan Co., Ltd., of Copenhagen, and (2) with R. Selby. The subscribers (with one share each) are:—R. Selby, 18, Brompton Square, S.W., gentleman; A. J. Owen, 30a, Cato Road, Clapham, S.W., clerk. Private company. The number of directors is not to be more than five; R. Selby is the sole managing director; qualification, £1. Registered office, 18, Red Lion Street, Holborn, W.C.

Electric Speller, Ltd. (120,448).—This company was registered on February 23rd, with a capital of £6,000 in £1 shares, to carry on the business of manufacturers of automatic and other apparatus for displaying advertisements or other information, &c., and to adopt an agreement with H. Tas and A. Cohen. The subscribers (with one share each) are:—H. Tas, Albion House, New Oxford Street, W.C., inventor; A. Cohen, 6a, Maddox Street, Regent Street, W., gentleman. Private company. The number of directors is not to be less than two or more than six; the first are H. Tas and A. Cohen; qualification, 250 shares; remuneration, £50 each per annum (chairman £75), and 5 per cent. of the net profits, free of income-tax. Registered office, 5, Robert Street, Adelphi, W.C.

A. T. Speedometer Co., Ltd. (120,406).—This company was registered on February 22nd, with a capital of £1,200 in £1 shares, to carry on the business of electrical and mechanical engineers, manufacturers of and dealers in mechanical apparatus of all kinds, &c., to acquire the business carried on by V. Korting, P. Rufer and G. Rensch, at 140, Long Acre, W.C., as the A. T. Speedometer Co. The subscribers (with one share each) are:—T. F. Bowman, 62, London Wall, E.C., solicitor; S. A. Sharpe, 62, London Wall, E.C. cashier. Private company. The number of directors is not to be less than two or more than seven; the first are V. Korting, G. Rensch and P. Rufer; H. Koffol and M. Brooke are the managers; remuneration as fixed by the company. Registered office, 140, Long Acre, W.C.

Imeson, Finch & Co. (1912), Ltd. (120,457).—This company was registered on February 23rd, with a capital of £5,000 in £1 shares, to take over the business of electrical, mechanical, tramway and general engineers, lately carried on by Imeson, Finch & Co., Ltd., at Stockton-on-Tees. The subscribers (with one share each) are:—C. A. Brentnall, 90, Southfield Road, Middlesbrough, merchant; W. Anderson, 45, Kensington Road, Middlesbrough, secretary; F. Smith, 140, Portland Street, Middlesbrough, accountant. Private company. The number of directors is not to be less than two or more than five; the first are J. W. Brown and C. A. Brentnall. Registered by Jordan & Sons, Ltd., 116-117, Chancery Lane, W.C.

C. J. Thursfield & Co., Ltd. (120,493).—This company was registered on February 26th, with a capital of £7,000 in £1 shares, to take over the business of designers and manufacturers of electric light fittings, metal workers and founders carried on at Cecil Works, Clement Street, Birmingham, as "C. J. Thursfield & Co.," and to adopt an agreement with C. J. Thursfield. The subscribers (with one share each) are:—C. J. Thursfield, The Mynd, Alvechurch, Worcester, manufacturer; A. Shirlaw, 139, Cannon Street, E.C., manufacturer. Private company; the number of directors is not to be less than two or more than five; the first are C. J. Thursfield and A. Shirlaw. Registered office, Cecil Works, 42, Clement Street, Birmingham.

M. R. W. Syndicate, Ltd. (120,365).—This company was registered on February 20th, with a capital of £2,000 in £1 shares, to carry on the business of manufacturers of, and dealers in, oil combustion, gas and electrical motors, dynamos, cycles, &c. The subscribers (with one share each) are:—F. Allen, 16, Eastcheap, E.C., solicitor; J. Allen, 16, Eastcheap, E.C., solicitor. Private company. The number of directors is not to be less than two or more than five; the subscribers are to appoint the first; remuneration as fixed by the company. Registered office: 56, Cannon Street, E.C.

Modern Kitchens, Ltd. (120,503).—This company was registered on February 26th, with a capital of £1,000 in £1 shares, to develop and turn to account the inventions of A. F. Berry in connection with electrical heating and cooking. The subscribers (with one share each) are:—R. Dand, 34, Norfolk Street, W.C., secretary; W. S. Mason, 105, Everhot Road, Stroud Green, N., clerk. Private company. The number of directors is not to be less than two or more than five; the subscribers are to appoint the first. Registered by W. O. Vizard, 10, Norfolk Street, Strand, W.C.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

J. Marse & Co., Ltd.—Particulars of £500 second debentures, created February 6th, 1912, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the whole amount being now issued. Property charged: The company's undertaking and property, present and future, including uncalled capital. No trustees.

Ozonair, Ltd. (84,770).—Return dated January 1st, filed January 9th, 1912. Capital, £20,000 in 10,000 preference, 4,900 ordinary and 5,000 "B" and 100 founders' shares of £1 each. 5,000 preference, 4,900 ordinary, 5,000 "B" and 100 founders' shares taken up. £14,900 paid on the preference, ordinary and "B." £100 considered as paid on the founders'. Mortgages and charges: Nil. (Original capital, £5,000 in 4,900 ordinary and 100 founders' shares of £1 each. Increased to £10,000 in April, 1909, and to present amount in April, 1911.)

Liverpool Electric Cable Co., Ltd. (71,099).—Return dated January 4th, filed January 15th, 1912. Capital, £10,000 in £1 shares. All shares taken up. £7,833 paid. £2,167 considered as paid. Mortgages and charges: Nil.

Costa Rica Electric Light and Traction Co., Ltd. (56,447).—Return dated January 3rd, filed January 11th, 1912. Capital £10,000 in £1 shares. All shares taken up. £7 paid. £129,993 considered as paid. Mortgages and charges: £271,050.

Spagnoletti, Ltd. (94,447).—Return dated January 13th, 1912. Capital, £20,000 in £1 shares; 12,353 shares taken up; £2,707 paid; £9,646 considered as paid. Mortgages and charges: £12,500.

Blackpool, St. Anne's and Lytham Tramways Co., Ltd. (59,184).—Return dated December 25th, 1911, filed February 10th, 1912. Capital £125,000 in 50,000 preference shares of 10s. each, and 99,900 ordinary and 100 management shares of 10s. each. All shares taken up. £72,000 paid in cash. £53,000 considered as paid on 65,000 shares. Mortgages and charges: £165,000.

Aluminium Corporation, Ltd. (106,421).—Trust deed dated February 13th, 1912 (supplemental to trust deed dated May 18th, 1910, securing £50,000 mortgage debenture stock), charged on rights affecting and various lands in Carnarvonshire. Trustees: London General Investment Trust, Ltd., 12, Moorgate Street, E.C.

Telephone Co. of Egypt, Ltd. (17,824).—A memorandum of satisfaction to the extent of £2,200 on February 14th, 1912, of trust deed dated July 27th, 1904, and three supplemental deeds of acknowledgment, securing £200,000 debenture stock, has been filed.

Kilowatt Publishing Co., Ltd. (90,715).—Issue on February 15th, 1912, of £400 debentures, part of a series of which particulars have already been filed.

Electromobile Co., Ltd.—Issue on February 15th, 1912, of £162 15s. debentures, part of a series of which particulars have already been filed.

Anglo-Norwegian Aluminium Co., Ltd. (92,830).—Particulars of £25,000 debentures, created by resolutions of December 18th, 1911, and January 15th, 1912, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the amount of the present issue being £100. Property charged: The company's undertaking and property, present and future. No trustees.

Metalite, Ltd. (110,919).—Debenture dated February 15th, 1912, to secure £2,713 4s., charged on the company's undertaking and property, present and future, including uncalled capital. Holder: W. P. Oulton, 9 and 10, Pancras Lane, E.C.

Electrical Installations, Ltd. (91,050).—A memorandum of satisfaction to the extent of £50 on February 26th, 1912, of debentures dated December 5th, 1906, securing £1,500, has been filed.

La Plata Electric Tramways Co., Ltd. (101,431).—Trust deed dated January 31st, 1912 (supplemental to trust deed dated May 26th, 1909), to secure £70,000 5 per cent. first mortgage debenture stock, ranking *pari passu* with £30,000 similar stock created by principal deed. Property charged: Concessions, lands, tramways, buildings and hereditaments, and the company's undertaking and property, present and future, including uncalled capital. Trustees: River Plate Trust Loan and Agency Co., Ltd., 52, Moorgate Street, E.C.

Electrical Advertising Co., Ltd.—Debenture dated February 14th, 1912, to secure £700, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: C. F. Kennedy, 13 and 14, Abchurch Lane, E.C.

Newtons, Ltd. (48,936).—Mortgage or charge dated January 16th, but not actually executed until February 13th, 1912, as verified by Statutory Declaration, to secure £1,000. Property charged: Freehold land and buildings in Herbert Street and Cyril Street, Rowbarton, Taunton, with fixed plant and machinery. Holders: A. E. Newton, Cutsey, near Taunton; H. N. Hickley, Taunton; and L. G. Caunter, Trentishoe Mansions, Charing Cross Road, W.C.

Balchin, Schulz & Co., Ltd. (98,799).—Debenture dated February 12th, 1912, to secure £500, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: H. J. Hayward, 6, Argyle Place, W.

Pontelec Welding Patents, Ltd. (107,935).—Issue on February 22nd, 1912, of £200 debentures, part of a series of which particulars have already been filed.

CITY NOTES.

Financial Transactions on the Continent.

The share capital of the *Elektrizitats Gesellschaft vorm H. Poege, of Chemnitz*, is to be raised to £175,000 by the issue of new shares of £50,000. The new shares have been taken over by the Dresden Bank at the price of 110 per cent.

The *Elektro Treuhand Bank*, which was jointly formed by the A.E.G. and the Siemens & Halske Co., is now being brought into actual existence with a share capital of £1,500,000, and is to be domiciled at Hamburg. The first transaction of this financing institution relates to the Hamburg Elevated Railway, the principal section of which will be opened for traffic at the beginning of March.

The recent extraordinary general meeting of the *Elektrizitats Gesellschaft vorm Schuckert & Co., of Nuremberg*, sanctioned the proposed increase in the share capital of £500,000 to £3,500,000. The proceeds of the issue are partly intended to meet the company's half-share in the loan of £1,000,000 recently decided upon by the two proprietary companies in the Siemens-Schuckert Works, and partly to meet the money requirements which have arisen in connection with other undertakings of the Nuremberg company. A banking syndicate, headed by the Vereinsbank, of Munich, has agreed to take over the new shares at the price of 131 per cent., and will, in due course, offer them to the shareholders in the Schuckert Co. at 140 per cent.

The Deutsch-Uebersecische Elektrizitats Gesellschaft (*German Transmarine Electricity Co.*), whose expansion of capital in recent years has been considerable, has just passed a resolution to make a fresh issue of £1,000,000 in new shares, thus increasing the share capital to £6,000,000. It is intended to apply the proceeds chiefly to meeting the current year's monetary requirements in connection with the large extensions of the supply works in Buenos Ayres, which are needed for satisfying the much greater demands for public lighting and for the underground railways. The shares are to be offered to existing shareholders at the price of 130 per cent. The development of the share capital is shown by the fact that it was raised from £1,800,000 to £3,600,000 in 1906, to £4,000,000 in 1909, £4,500,000 in 1910, and to £5,000,000 at the beginning of 1911. In addition, the loan capital amounts to £4,250,000 at present, the undertaking representing one of the largest German investments abroad.

The Deutsche Bank announces that the directors of the *St. Petersburg Electric Lighting Co.*, of 1886, have decided to increase the share capital from 30,000,000 to 40,000,000 roubles, by the emission of 10,000,000 roubles of new ordinary shares. In addition to providing for the extinction of floating liabilities, the money to be raised will be devoted to extensions of the supply works in St. Petersburg, Moscow, and Lodz. It is denied that the company intends to become financially interested in new supply works in Moscow for which a Belgian company is endeavouring to raise capital in Belgium and France, and for which the Moscow city council granted a concession a few months ago.

The Bank für Elektrische Unternehmungen, of Zurich, which is associated with the A.E.G., of Berlin, is making a fresh issue of 4½ per cent. bonds amounting to £400,000. The repayment of the loan is to take place at the nominal value as from July 1st, 1926, although the right is reserved of giving notice of total redemption in July, 1921. As in the case of previous loans, so in the present instance is no special guarantee given to the bonds, although the bank undertakes not to raise any other loans with special security before the whole of this loan is repaid. The share capital of the bank amounts to £2,400,000, and the total bond issues, inclusive of the new loan, represent £2,480,000. The dividends paid in the past four years have been uniformly at the rate of 10 per cent.

Stock Exchange Notices.—The Committee have appointed special settling days as under:—

Thursday, March 21st.—Ruston, Proctor & Co., Ltd.—Further issue of 15,000 ordinary shares of £10 each, fully paid (Nos. 35,001 to 50,000).

Friday, March 22nd.—Dryden Timber and Power Co., Ltd.—Fully-paid scrip for £154,300 6 per cent. first mortgage sinking fund gold bonds.

Marconi Wireless Telegraph Co. of Canada, Ltd.—1,000,000 shares of $5 each, fully paid.

Applications have been made to the Committee to appoint a special settling day in and to grant a quotation to:—

Compania de Electricidad de la Provencia de Buenos Ayres, Ltd.—5 per cent. first mortgage gold bonds.

To appoint a special settling day in:—

Sun Power Co. (Eastern Hemispheres), Ltd.—10,507 ordinary shares of £1 each fully paid, Nos. 1 to 7,150,008 to 155,007 and 160,008 to 165,507.

And to allow the following securities to be quoted in the Official List:—

Monterey Railway, Light and Power Co.—Further issue of £200,000 5 per cent. first mortgage debenture stock.

Davis & Timmins, Ltd.—The directors report that, for the year ending December, 1911, the net profit, including £8,046 brought forward, after allowing for depreciation and commission to manager, was £22,162. The interim dividend paid in September last on the preference shares absorbed £1,800, that on the ordinary shares at the rate of 6 per cent. per annum for the half-year to June 30th, 1911, £1,410. There has been placed to general reserve account the sum of £2,000, leaving a balance of £16,952 to be dealt with. The directors propose a six months' dividend on the preference shares, at 6 per cent. per annum, to December, 1911, requiring £1,800; a balance dividend at the rate of 10 per cent. per annum on the ordinary shares for the half-year to December, 1911, making 8 per cent. for the year, absorbing £2,350; a bonus of 5 per cent. out of profits, £2,350; leaving to be carried forward, £10,452.

Prospectuses.—*Alby United Carbide Factories, Ltd.*—This company is offering until to-day 150,000 5½ per cent. cumulative convertible preference shares of £1 each at par, the money being necessary for increasing the capacity of the plant at the Odda Factory and the general extension of the company's business.

Alabama Traction, Light and Power Co., Ltd.—The list was to close yesterday in respect of an offer of $6,000,000 first mortgage 5 per cent. 50-year gold bonds at £90 per bond of $500.

Kentucky Traction and Terminal Co.—The L. and S. W. Bank has lately offered for subscription $1,000,000 5 per cent. first and refunding mortgage sinking fund gold bonds in this company.

Alley & Maclellan, Ltd.—The directors report that the profit from trading for the year to December 31st, after meeting all necessary charges, is £18,086, plus balance from last year, making £19,537. After paying a half-year's dividend on the preference shares at the rate of 5½ per cent. per annum, amounting to £1,683, the directors have transferred to reserve fund £4,287, and they recommend payment of dividend on the preference shares for one and a-half years to December 31st, 1911, at the rate of 5½ per cent. per annum, less tax, absorbing £5,049-£1,690 is carried forward.

Western Telegraph Co., Ltd.—The directors have declared the second quarterly interim dividend of 3s. per share for the year ending June 30th, 1912, being at the rate of 6 per cent. per annum.

County of Durham Electrical Power Distribution Co.—The directors have declared a dividend of 5 per cent. for the year to December 31st on the preference shares.

Globe Telegraph and Trust Co., Ltd.—The directors have declared an interim dividend of 2s. per share on the ordinary shares.

Continental.—Switzerland.—La Société Suisse pour l'Industrie Electrique, of Basle, is declaring a dividend of 7 per cent. for the last financial year, the same as for the preceding 12 months.

(*Continued on page* 392.)

NEW ENGINEER-IN-CHIEF TO THE POST OFFICE.

An official announcement appeared in the daily Press last Friday, stating that the Postmaster-General had appointed Major O'Meara, C.M.G., R.E., to be Engineering Special Commissioner charged with the duty of examining and reporting upon the telegraph and telephone systems of Europe. The notice continued :—"Major O'Meara has been engineer-in-chief of the Post Office since April, 1907, but unfortunately the state of his health is not such as to enable him to retain this office. Mr. W. Slingo, one of the assistant engineers-in-chief of the Post Office, has been appointed by the Postmaster-General to be engineer-in-chief, in succession to Major O'Meara."

W. Slingo, Engineer-in-Chief to the General Post Office.

Mr. William Slingo, the new engineer-in-chief of the British Post Office, commenced his business career on the commercial side of the Telegraph Department of the General Post Office (in fact, at the Central Telegraph Office) in 1870. Mr. Slingo must be regarded as one of the pioneers of technical education, for in 1876 he founded the Telegraph School of Science at the General Post Office, having then only five students under his tuition. He remained as principal of this school until 1898, by which time the membership had reached the high total of 850. He was also head of the electrical section at the People's Palace, which is now known as the East London Technical College. In 1898 the Telegraph School of Science at the General Post Office was closed, and the work in connection therewith was transferred to the Northampton Polytechnic Institute, Clerkenwell. Consequently, Mr. Slingo's services were transferred to the engineering department of the Post Office, where he was employed in the first instance as a first-class technical officer. In this capacity, Mr. Slingo established Hughes Duplex working between London and the Continent, and he also developed a system of secondary battery working which was applied to a considerable extent to the telegraph offices in the United Kingdom. At the close of 1903, Mr. Slingo was promoted to the position of superintending engineer of the North Wales Engineering District, with headquarters at Liverpool, and in this capacity he acquired considerable experience in telegraph and telephone engineering practice. In January of last year he returned to the General Post Office, London, to fill the post of assistant engineer-in-chief. His appointment to the high position of engineer-in-chief dates from the 1st inst., and he succeeds in that capacity a no less distinguished public servant than Major W. A. J. O'Meara, C.M.G., R.E.

During his career in the Post Office service, Mr. Slingo has seen enormous developments in the telegraph and telephone services, and he has witnessed as many as four transfers. In the first year of his service, the transfer of the telegraphs to the State was accomplished; in 1889, the undertakings of certain of the submarine telegraph companies were absorbed in the Post Office service; in 1896, the trunk telephone services were transferred to the State, and at the dawn of the present year the local telephone services hitherto controlled by the National Telephone Co. were transferred to the Post Office. In view of the transfer of the company's plant and staff to the State, the preparation of the inventory and the valuation of the company's plant, and the forthcoming arbitration proceedings in connection with that valuation, it will be realised that Mr. Slingo has taken up the reins of a great Department at a time of considerable public importance.

Mr. Slingo's reputation as an author of technical literature is world-wide. Chief among his publications is the book on "Electrical Engineering," the authorship of which he shared with Mr. A. Broker. Mr. Slingo is 56 years of age.

F

ELECTRIC WINDING ON THE RAND.

The West Rand Consolidated Gold Mines, Ltd., is at present working one shaft (the East shaft) and sinking a second on an estate of nearly 2,000 claims situated around Krugersdorp, about 20 miles from Johannesburg. Their crushing capacity at the end of 1909 was about 30,000 tons per month, and in 1910 about 70,000 tons per month, and with the completion of the new shaft this figure will be greatly augmented.

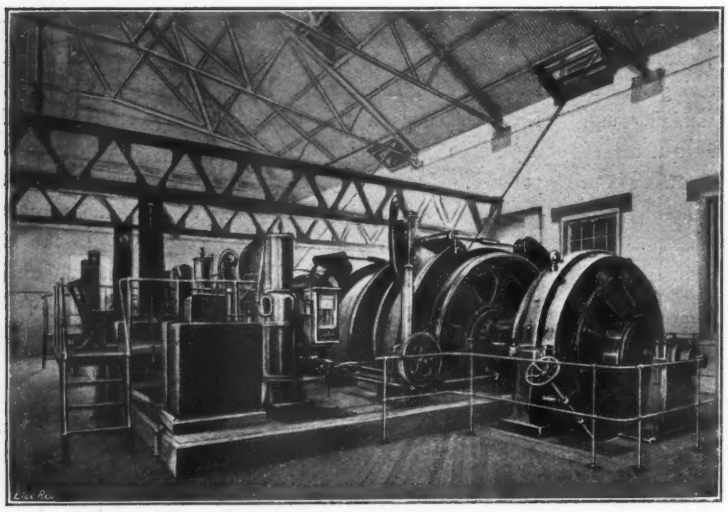


Fig. 1.—450-h.p. Westinghouse Motor Driving 3-ton Hoist.

The West shaft of this mine, which is at present in course of sinking, is a seven compartment shaft, and is being driven downwards at an angle of 50° to the horizontal to an estimated distance of 3,000 ft. Sinking was commenced by means of a temporary headgear and two small steam sinking engines, and at the same time an order was placed for two double-drum electric winding engines—one suitable for a 6-ton useful load, and the other for a 3-ton useful load.

By the time the electric winding engines were installed, the permanent headgear was completed, and the shaft had been sunk to a sufficient depth to permit of economical hoisting with the electric hoists. The permanent headgear, is built entirely of steel. The engine room is remarkable as it is built of brick, and is very commodious, whereas the usual engine room on the Rand is of corrugated iron construction.

The two hoists were supplied complete, and their erection supervised, by the British Westinghouse Co., Ltd., who purchased such parts as drums, brakes, drum shafts, and bearings, from the Dingleische Maschinenfabrik A.G. under the terms of the order. The mechanical equipments of both hoists are almost identical, in spite of the difference in the loads. The services for which these hoists are designed, are :—

	Hoist No. 1.	*Hoist No.* 2.
Inclination of shaft to horizontal ...	50°	50°
Length of shaft ...	3,000 ft.	3,000 ft.
Hoisting speed ...	2,000 ft. per min.	2,000 ft. per min.
Weight of rock per wind	1,200 lb.	6,000 lb.
Weight of skip ...	7,560 lb.	5,500 lb.
Weight of rope ...	8,500 lb.	6,000 lb.

Each hoist is equipped with two drums, 10 ft. diameter × 3 ft. 9 in. wide between flanges, which run loose on the drum shaft, and are driven by multi-tooth clutches sliding on hexagonal sections of the shaft. The clutches are operated by hand-wheels on the driver's platform.

Post brakes are provided on each drum, of the segmental type, supported in the centre, and applied by weights. Compressed-air engines with "Iversen" valve gear are used for releasing the brakes. Interlocks are provided so that the brakes cannot be released on a drum that is not clutched to the main shaft. Compressed air for operating the brakes is obtained from a small compressor driven through gearing by a 16-h.p. three-phase 50-period 4,500-volt squirrel-cage induction motor, fitted with automatic starting and stopping gear controlled by the air pressure.

The position of either cage in the shaft is indicated by two dial depth indicators driven one from each drum through gearing. Each indicator has two points, one moving slowly during the entire travel of the skip and the other moving very rapidly during the final part of the wind, so as to increase the accuracy of stopping. Automatic devices are provided, which bring the skips to a dead slow speed at the tips, and stop the hoist dead should the skips pass that level, irrespective of any action on the part of the driver.

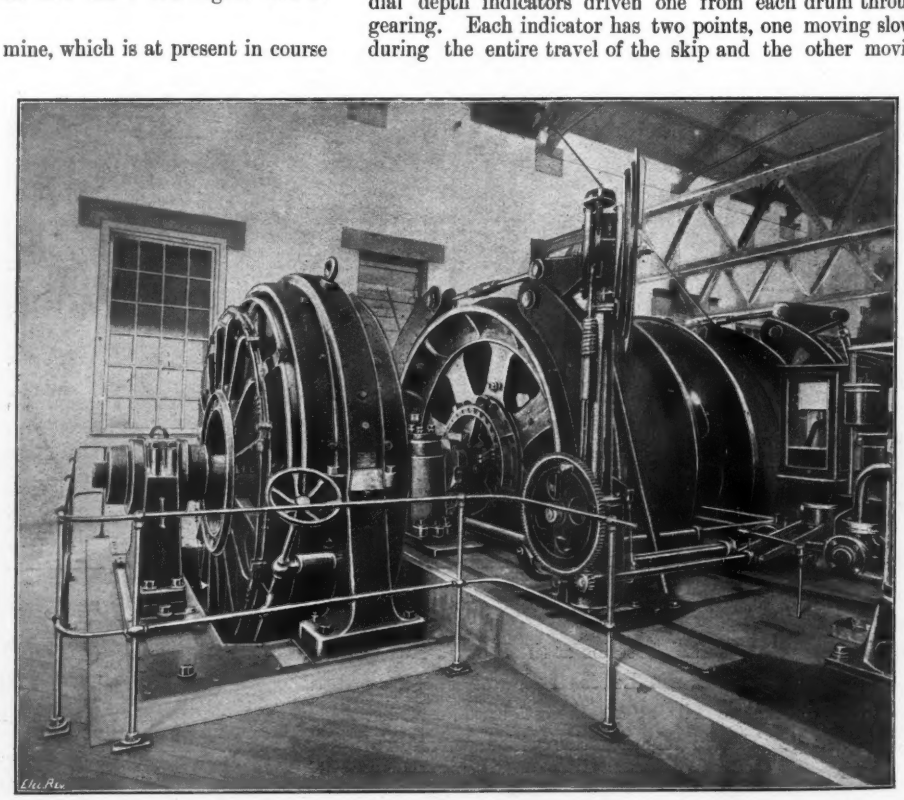


Fig. 2.—750-h.p. Hoist Motor; West Rand Consolidated Mines.

The electrical equipment is designed for operation on the

now well-known Ward-Leonard system. The winding motors are directly coupled to the drum shaft, and in each case operated at 60 R.P.M. On hoist, No. 1, there is a 750 B.H.P., 60-volt D.C motor provided with commutating poles; fig. 2 shows this motor together with some of the mechanical parts. Hoist No. 2 is provided with a 450-H.P. D.C. Westinghouse motor, shown in fig. 1, together with the drum, driver's platform and other gear.

Power for the winding motors is obtained from two motor-generator sets, arranged so that either hoist may be driven by either motor-generator, provision also being made for the third equipment in contemplation. The interchange switchgear for the motor-generators is shown in fig. 5.

Each motor-generator set comprises a 200-volt, three-phase, 50-period, slip-ring induction motor, directly coupled to a D.C. generator and an exciter. The arrangement of the set for No. 1 hoist may be seen in fig. 4. The A.C. supply for driving the motors of the motor-generator sets is purchased from the Victoria Falls and Transvaal Power Co., Ltd.

In the Ward-Leonard system, the speed and direction of rotation of the winding engine are controlled entirely by altering the strength and direction of the D.C. generator in the motor-generator set. This is carried out by means of a special face-plate controller illustrated in fig. 7. By means of this controller, any desired speed may be obtained up to full speed in either direction, the speed corresponding closely to the position of the driver's lever, irrespective of the load. These controllers are fitted with stops controlled electrically from the bank so that half-speed cannot be exceeded when men are being raised.

An emergency device is provided for each hoist, arranged and connected so that the hoists are quickly stopped in case of—(1) overwinding; (2) failure of power supply; (3) failure of exciting current; (4) overloads; (5) failure of air supply; (6) operation of driver's emergency lever. There is thus a safeguard against practically any danger that might arise.

A four-panel switchboard, illustrated in fig. 3, is used for controlling the supply of power to the two winding engines, and is arranged to permit of extension when required. The switchboard is equipped with one A.C. and one D.C. panel for each hoist, the former for the motor, and the other for the fields of the various D.C. machines.

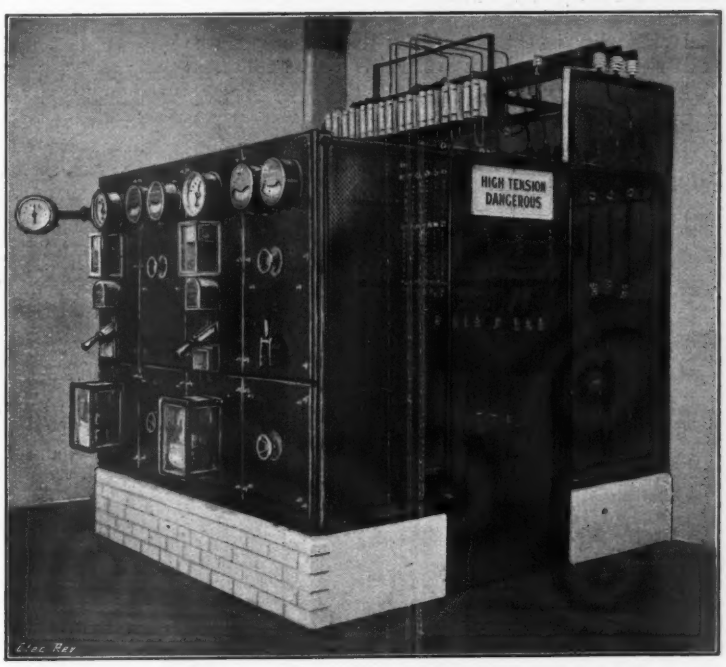


Fig. 3.—Four-panel Switchboard, Winding Engine House.

Although the Ward-Leonard system may be readily adapted for use with a fly-wheel so that no peaks are reflected into the mains, no attempt has been made to equalise the load of these winding engines, since the stations of the Victoria Falls and the Transvaal Power Co. are large enough to be untroubled even by the heavy peaks of the large winding engines in use on the Rand.

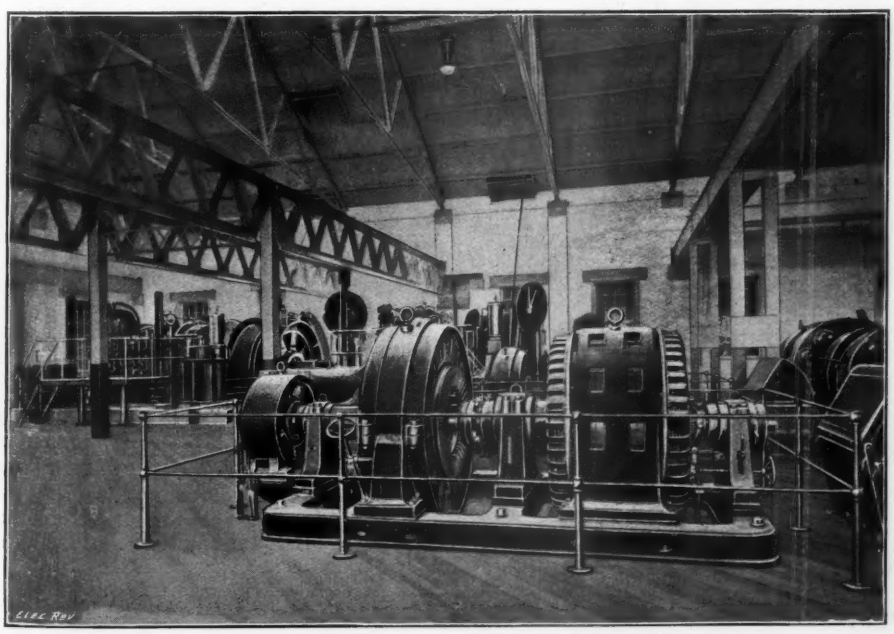


Fig. 4.—View in West Rand Winding Engine House, Showing 650-H.P. Motor-Generator in Foreground.

In conclusion, thanks are due to the engineers of the General Mining and Finance Corporation, who permitted the reproduction of the photographs, &c.

Whist Drive.—On Thursday last week at Messrs. Slater's Baltic Restaurant, Leadenhall Street, E.C., a large gathering assembled in connection with the Siemens staff whist drive. Some 320 members of the staff and their friends spent a thoroughly enjoyable social evening. Mr. L. A. Thomson officiated as M.C., and Mr. W. H. Hitchcock as Hon. Secretary. There were 13 prizes. Refreshments were served during an interval after the twelfth hand. The prizes were presented by Mrs. Knowles. These functions are becoming increasingly popular. The first, held in the January of last year, resulted in an attendance of about 150, whilst at that held in January, this year, 210 attended.

REVIEWS.

Power House Design. By J. F. C. Snell. London: Longmans, Green & Co. 1911. Price 21s. net.

This book is the first volume of an electrical engineering series which is being brought out by Messrs. Longmans, and deals with the complete design of electric power stations. Special originality is not claimed by the author, and the book consists principally of the collection and classification

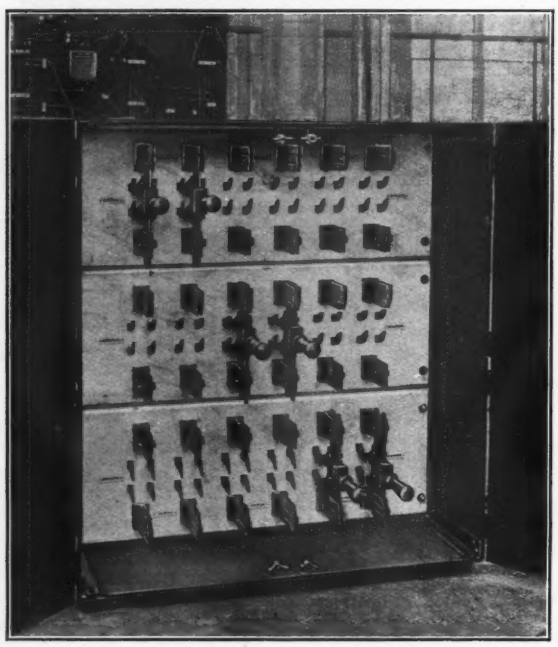


Fig. 5.—Transfer Panel, showing Switches, West Rand Winding Plant (p. 389).

of the wide experience which he has obtained during the last 20 years, together with that of other eminent engineers.

A short introduction and Chapter I deal respectively with the general principles underlying powers-tation design, and with commercial systems of supply now in use for different classes of work. A useful feature lies in the fact that the load factors, which may reasonably be expected for all usual types of generating station, are given.

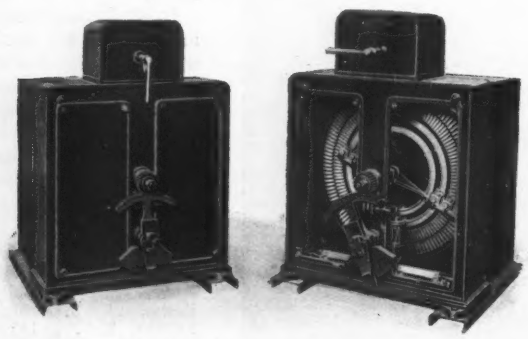


Fig. 7.—Field Controllers, West Rand Winding Plant (p. 389).

Chapter II is a well-written essay on the choice of a site for a power station, and the type of plant to be installed thereon. Good information is given as to the size of units in relation to load factor, stand-by plant, and so on. An emphatic plea is put in for simplicity in design, with which we are entirely in accord.

The important subject of buildings receives attention in Chapter III. The architecture of power-station buildings is treated in a dignified and forcible style by the author, and we are quite in sympathy with his remarks. It is difficult to see how any rational being can justify the capital expenditure on the elaborate ornamental stonework, &c., which is so commonly used abroad, and occasionally in this country. Foundations, steelwork specifications, brick chimneys and various costs receive satisfactory treatment. The necessary buildings for gas power stations are described, and examples given from English and foreign practice.

Chapter IV deals in a definite manner with steam-raising plant. Boilers of modern types, boiler settings, mechanical draught, feed water, ash disposal, water-softening, &c., all receive adequate description. A mistake occurs on page 85, in that it is stated that a squirrel-cage induction motor can be given three regular speeds by means of a controller and resistances. As is, of course, well known, the only way of varying the speed of a squirrel-cage motor is to put separate windings on the stator for the speeds required, and thus make it possible to alter the number of poles in use. The introduction of resistance into the stator circuit certainly reduces the torque and lowers the efficiency of the motor, but the speed of the machine is entirely fixed by the frequency of the supply and the number of poles on the motor. Another slip occurs on page 84, where a motor is spoken of as "the squirrel-cage three-phase slip-ring type." The design of steel chimneys is entered into in a fairly thorough manner, and it is interesting to note that a wind pressure of 28 lb. per sq. ft. on the projected area of a circular chimney is taken for calculating the overturning effect. It is worthy of note also that the author favours steam-driven feed

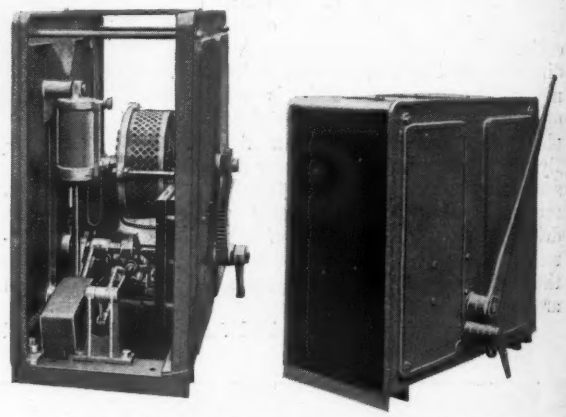


Fig. 6.—Emergency Devices at the West Rand Mines (p. 389).

pumps, instead of the motor-driven type that has come into use of late.

Steam and feed pipe systems are next described. A number of useful tables are given relating to the flow of steam, velocity of steam in pipes, dimensions of pipes, and so on. The importance of drainage in steam ranges is recognised, and the subject receives special consideration. We are pleased to see a photograph and a good description of a rotary strainer.

Chapter VI is devoted to steam-driven prime movers. Lengthy descriptions of very large obsolete low-speed engines are omitted. The author suggests that 750 to 1,000 KW. marks the lower limit for the economical application of steam turbines and the upper limit for high-speed reciprocating engines, and the reviewer is inclined to agree with him. A good deal of information is given with regard to steam consumption, the value of superheating, &c. The various types of steam turbines are described in a concise and interesting fashion, and the author inclines to the idea that the impulse type will out-last the pure reaction type for large sizes. Some useful ideas are given with respect to water loads for testing purposes.

The design and construction of condensers, cooling towers, air-pumps, &c., receive the attention their importance justifies in Chapter VII. A large number of curves and tables are given, which will prove useful to designers of such apparatus.

Chapter VIII is a lengthy one, dealing with gas and oil engines, producers and superfluous-heat generating stations. The advantages and disadvantages of internal-combustion

engines generally are carefully analysed by the author, and we agree, on the whole, with his conclusions. When the cost of fuel is low, combined with a low annual load factor, there can be little question that gas engines will not favourably compare with steam plant, in spite of their much higher thermal efficiency. Some useful data and figures are given regarding repairs, maintenance, depreciation, &c. The section dealing with oil engines is chiefly devoted to the Diesel engine, and the matter on waste-heat stations, while very good as far as it goes, is somewhat brief.

Hydro-electric power stations are next discussed. The fundamental problem to be solved in this class of engineering is the minimum flow of water, and the probable frequency and duration of such flow, and the author has duly appreciated this. The selection of appropriate turbines for different heights of fall and dams, head races and penstocks, receive the treatment they merit. Representative examples of modern practice are given, together with a number of good illustrations. Practically all that is really essential regarding hydro-electric practice is included, although the author refers the reader specially interested in this work to one of the bulky books on this particular section of power station design.

Chapter X deals with the general design and lay-out of switchgear, and is well illustrated by a number of plates. The essential features of good design are well and clearly pointed out, and the examples of switchboards that are described in detail are well up-to-date. We are glad to see that continuity of supply is made a special point.

Practical notes on generators, motors, boosters, transformers, &c., occupy the next chapter. These notes will be found to be of considerable value, and the practical constants relating to the design of machines are always on the safe side. For example, the author advises the restriction of the generator pressure to 6,600 volts. In the United States the superior limit for this voltage is considerably higher. The author's views as to the best type of commutator for direct-current turbo-generators are, perhaps, open to question, although this point is largely a matter of opinion only at the present stage of the art. Batteries are treated in a highly satisfactory style, and we should have liked to see rotary converters discussed in a like manner. Perhaps, more than any other, this chapter shows the author's intimate acquaintance with modern and stringent specifications.

The last chapter consists of a useful discussion on the design of small power houses and sub-stations for shipyards, factories, docks, &c., and sufficient information and examples are given to enable an engineer to put down a station of this character to suit any special local conditions.

The book concludes with five appendices dealing with water-tube boilers, velocities in circulating water pipes, electricity regulations, chimney cooling towers and tests of steam feed pumps.

The book is wonderfully free from printers' errors, the one or two that do occur being easily detected. It contains 17 folding plates and 186 illustrations. A special feature which must be commended is the information given regarding the capital cost of practically the whole of power station plant. It may be said that at the present time these figures are on the top side. The book will undoubtedly be of the utmost value to engineers who have to put down a power station without the aid of expert assistance.—H. G. S.

Educational Notes.—Now that so much attention is being directed to the necessity for giving young electrical engineers some training in commercial work, it is of interest to note that the City and Guilds of London Institute has definitely decided to establish an examination in Quantities and Estimates for Electrical Engineers. A class for teaching the subject to mechanical engineers was started at the Northampton Institute, London, five years ago, and in 1909 Dr. R. M. Walmsley, the principal, decided to start a similar class for electrical students, Mr E. Kilburn Scott, M.I.E.E., being appointed lecturer. Experience has conclusively shown that the subject is one that can be taught in class quite as well as the purely technical details of engineering. The Battersea Polytechnic started a course last year, and no doubt other institutions will take it up now that an examination is to be held.

ELECTRICITY AND COAL SUPPLY.

At a time when coal is no longer supplied to them from day to day, and they are compelled to fall back upon reserves, electric lighting authorities will be anxious to know their position with regard to the public. What is the obligation of a supply authority to continue to provide energy irrespective of the price of fuel? Penalties are imposed by statute on any "undertakers" who "make default in supplying electricity to any owner or occupier of premises to whom they may be required to supply energy"; but the penalties to be inflicted on the undertakers "Shall in no case exceed in the aggregate in respect of any defaults not being wilful defaults on the part of the undertakers the sum of £50 for any one day." The same Act provides that "in no case shall any penalty be inflicted in respect of any default, if the Court are of opinion that the default was caused by inevitable accident or *force majeure*, or was of so light or unimportant a character as not materially to affect the value of the supply." The latter part of this proviso is not likely to assist the supply authorities in the present crisis. A shutting-down owing to lack of coal could hardly be said to be a stoppage of a slight or unimportant character. The question is, could it be said to be due to inevitable accident or *force majeure?* In ordinary commercial transactions, the risk of a strike is within the contemplation of the parties. If a man undertakes to deliver goods by a certain day, and is prevented from doing so by a strike causing delay in transport, or a strike which prevents his obtaining the necessary fuel for manufacturing the goods, these are risks thrown upon him and not upon the purchaser. They cannot even be said to amount to *force majeure*. In the case of electricity supply, however, the Court appears to have a wide discretion; and it is considered that the industrial war in which the country is now plunged would fully justify any magistrate in holding undertakers free from responsibility. Strange to say, there is no case which can be said to be in point. Mention may be made, however, of the Sun Insurance Co., Ltd., *v.* Dublin Corporation (1899), where it was held that the fusion of an electric cable, which caused the breakdown of supply, was an "inevitable accident" for which the Corporation was not to be held responsible. In another case (Marylebone Vestry *v.* Metropolitan Electric Supply Co. (1900)), the company were summoned for making default in supply to the workhouse and vestry premises on certain days. The company admitted the default, and contended that the same was due to inevitable accident caused by a great increase in the demand for electricity which had exceeded their expectations. After an adjournment of the summons for three months, a small fine was imposed.

As to the expedient of raising the price, it is doubtful whether this could be done, having regard to the contract which is entered into with each consumer.

If prices could be raised one distinct advantage would accrue, namely, a certain amount of waste would be checked.

Rifle Range.—On February 28th the new miniature rifle shooting range at the Recreation Hall of the Paisley District Tramways Co. was opened in presence of over 100 of the employés and a large and representative gathering of the inhabitants of the district, who take an active interest in the Tramwaymen's Recreation Club. The first shot, which proved to be a bull's eye, was fired by Miss Lillian Charles, the famous world's shot, who then, in a short and appropriate speech, declared the range open and wished the members all success in their shooting. Her father, Major Charles, on behalf of his wife, his daughter, and himself, handed over to the rifle range, as a present from the Three Royal Dreadnoughts (this being their professional *nom de guerre*) a handsome silver cup standing about 12 in. high, which is to be competed for in any manner the general manager may think best in the interests of the club. Captain Coutts, the tramway manager, in accepting the gift, asked Miss Charles to accept a jewelled bangle from the members of the society as a memento of her visit to Paisley, and as a token of their appreciation of her presence with them that day. Afterwards the company were entertained to tea, and Miss Charles gave an excellent exhibition of shooting by piercing 3d. pieces set up face on and cutting them through edge on, as she also did some visiting cards; the visitors retained these as souvenirs of the occasion.

CITY NOTES.

(*Continued from page* 386.)

Westminster Electric Supply Corporation, Ltd.

MR. J. BROWNE MARTIN presided at the offices, Eccleston Place, Westminster, on February 28th, over the annual meeting of this company.

In moving the adoption of the report (see ELEC. REV., page 308), the CHAIRMAN first referred to the death of Mr. E. Boulnois, one of the original directors, and to the election in his place of Mr. Montague Gluckstein, who had many interests in their area. They sold last year nearly one million units more than in 1910, and their receipts were £6,000 higher. The larger part of the increase had been in power and heating, and they were also on the right side as to lighting, which was satisfactory as showing that they were getting over the temporary set-back due to the metal lamp. The costs were increased by £3,000, but £2,000 of that was dut to the legal expenses incurred, mainly owing to the ineffective attempt to get their excessive rating assessments reduced to more reasonable proportion. The result was that they were only carrying to net revenue £2,700 more than they did a year ago. With regard to the future, one often heard some say that the sale of electricity for lighting purposes must have reached a saturation point. It always seemed to him that this point bore some relation to another they had all heard of called the vanishing point. If it had been anywhere except on the horizon, they could never have hoped to recover from the advent of the metal lamp, which he had alluded to as a difficulty. Difficulties were made to be overcome, and when they were surmounted they were all the better for having encountered them. It was so in their case. The metallic lamp made it certain that electricity would be the universal agent for lighting, even for those who had to be the most careful with regard to cost, whilst for those who were willing to use electricity with carbon lamps, it opened up a new system by means of concealed and reflected light, which was almost impossible before, because of the expense. Heating and cooking, the working of lifts, driving motors, and, in fact, almost every conceivable purpose, opened up an almost unlimited future, and their extension of business in this direction must be very large indeed. No one who was not constantly engaged in this business could have any idea of the variety of applications of electricity. Now, it was not too much to say that no matter what they wanted done they could do it better and more economically by electricity than in any other way. He hoped the shareholders would spend a few minutes in the demonstration rooms they had established in that building, as it would give them some idea of what was practical now. Their area was mainly residential, afforded a very large field for the sale of electricity for all household and domestic purposes. The company bade fair to be as successful in the future as in the past and the best service the shareholders could render was to tell everyone what they would see in the company's showroom downstairs.

MR. HAYES FISHER, M.P., seconded the motion.

Replying to questions by MR. PALGRAVE SIMPSON and MR. REYNELL, the CHAIRMAN said the item of special charges was in respect of the 28,000 preference shares issued in December, 1910. The issue had not been quite taken up by the shareholders. They were prepared for the coal strike.

The motion was carried.

The CHAIRMAN proposed that a dividend at the rate of 10 per cent. be declared.

CAPTAIN BAX, in seconding, remarked that to maintain a dividend of 10 per cent. with the advent of the metallic-filament lamp was very satisfactory.

The motion was carried.

MR. R. WALLACE, K.C., moved the re-election of the retiring directors, and CAPTAIN BAX, in seconding, said that in 1891 they had 750 consumers, against 10,000 now. In 1891 they sold 600,000 units, and the average price obtained was 7¼d. per unit. Last year they sold 18,000,000 units, and the average price was 3¼d. per unit.

The motion was carried.

North Metropolitan Electrical Power Distribution Co., Ltd.

THE meeting of this company was held on Friday last at the Electrical Federation Offices, Kingsway.

MR. JAMES DEVONSHIRE, who presided, in moving the adoption of the report (see ELECTRICAL REVIEW, page 532), said the directors were able to recommend an increase in dividend from 4 per cent. to 5 per cent., after allowing £2,000 for depreciation purposes, which compared with £1,500 for the previous year. The past year had, therefore, been one of satisfactory progress. The gross revenue showed an increase of £1,217, which was an improvement of 8·4 per cent., whilst the expenses had increased by £621, equivalent to only 6·3 per cent. in excess of 1910. The amount available for appropriation, £4,715, showed an improvement of £883. A striking feature was the ratio which the net revenue bore to the capital expenditure. The revenue had amounted to £15,806, which was no ess than 23·5 per cent. upon the total capital expenditure (£67,075). It was not easy to make any comparison with other electrical undertakings, but he believed the position of the company was unique in that respect. It was only fair to say that the explanation lay in the arrangements which the company had with the North Metropolitan Electric Power Supply Co. under which that company supplied them in bulk with their electrical energy, and so relieved them from any expenditure on generation, or even transforming plant or buildings. The revenue had expanded in connection with each of their four undertakings with the exception of Enfield, where there was a small decrease of £26. While that was due to the temporary loss of certain power business, it was also to be explained by the fact that their arrangements with the Power Co. had been somewhat varied. If the directors' proposals were agreed to, the amount of the depreciation fund would be raised to £5,200. Although it might be argued that that was a small figure, it had to be remembered that the capital expenditure was principally in connection with mains upon which depreciation was certainly small; and, indeed, under certain circumstances, there might be an appreciation. For instance, if the price of copper were to rise to £100 per ton, there probably would be an appreciation. In the balance-sheet there was an item of £561, expenditure on the Wembley Electric Lighting Order. That would disappear during the current year, as, in response to their application to the Board of Trade, they had received a notification that the Department would revoke the order, and they would consequently write it off out of revenue.

MR. W. L. MADGEN, in seconding the resolution, said the chairman had drawn attention to the very gratifying feature in the accounts that the ratio of gross revenue to total capital was so high as 23·5 per cent. Some few years ago he (Mr. Madgen) had occasion to get out similar figures for a number of undertakings, both municipal and private, and he found that 12 or 15 per cent. was a very high figure. Times had changed, of course, and if one got out a similar list now, they might find that the ratio had improved, but, none the less, 23·5 per cent. was very gratifying to them. From the point of view of the community in the north of London, the position was also very satisfactory, because they got their current for lighting, power and other purposes at as low a price, if not lower, than any similar districts in or around London. One was often told, in mentioning the low rates at which people in North London got their current—districts such as Barnet and Hertford—that everything was very dear in London, but it should also be remembered that the output was very large in London, and the striking comparison still remained that in small places, such as Barnet and Hertford, current could be obtained for domestic or industrial purposes as cheaply, if not more cheaply, than in large London districts. That advantage principally arose from their association with the power company which had large main generating stations at Willesden and Brimsdown, and it was interesting to note, from the point of view of towns elsewhere which had not yet been provided with an electrical supply, that since the power company with which they were associated commenced operations, no separate isolated generating stations had been started within the company's area, which covered an extent of over 300 square miles. The position of the company was in all respects highly satisfactory, and the shareholders were to be congratulated upon the results.

The report was adopted.

Chelsea Electricity Supply Co., Ltd.

THE annual meeting was held at Winchester House, E.C., on Tuesday, Sir Irving Courtenay presiding.

The CHAIRMAN, in moving the adoption of the report (see ELECTRICAL REVIEW, page 355), said that the figures showed some further improvement, the revenue being higher and the expenses slightly less. The revenue had increased, though a large temporary supply for power which they furnished in 1910 was discontinued at the end of that year. As they had, nevertheless, improved the position by about £1,000, he thought they were entitled to look for good results in the coming year. The usual amounts had been placed to reserve, and £1,000 had been written off the cost of purchase of the Cadogan Electric Light Co., the addition to the amount carried forward being much the same as last year, and the dividend recommended was the same, namely, 5 per cent. for the year. The actual addition to capital expenditure was small—£5,260—£1,000 of this being on machinery, and £2,500 on mains. The title of No. 5 account was now reserve for renewals, depreciation and contingencies. The amount placed to depreciation account had always been based on the life of the property and plant as estimated by the engineer, and the yearly small increase in the sum set aside had been arrived at by actuarial calculations, so as to write off the value of the property during the period of its life. It had been deemed advisable to alter the title of the account to which the provision was placed, and thus make it more elastic. The total number of units sold during 1911 showed a decrease as compared with the output for the previous year. This decrease, however, was satisfactorily explained by the fact that in the previous year they had the benefit of a comparatively large demand for motive power purposes in the execution of some special engineering work. They did not expect to connect additional supplies during 1911 to make up entirely for the reduction in units sold due to the discontinuance of this temporary power load. As a matter of fact, the progress made in securing additional customers during the past year had been quite satisfactory, and although the total output in units was slightly reduced, the total value of the units sold showed an actual increase of £450. The explanation of this was that the supply for the temporary power purposes in 1910 was sold at a lower price per unit than that which was obtained for the additional supplies for lighting and general purposes in 1911. They connected the equivalent of 10,289 8-C.P. lamps during the year, which was about the average of the additional connections made during the previous three years. The extension of a permanent connection, as distinguished from a temporary demand, such as he had referred to,

was therefore quite satisfactory. When there was a reduction in the output in units, such as occurred in the last year for the reason he had mentioned, it was naturally not always possible to keep down the working costs in the same proportion, as some charges, such as wages, superintendence and general maintenance of plant were practically the same for varying outputs within reasonable limits. It was, therefore, satisfactory to be able to report that, notwithstanding the reduction in the output, the works cost per unit sold last year was no higher than it was for the previous year. This result was due to a further economy which had been effected in the fuel cost per unit. The situation in the coal trade had naturally caused a certain amount of anxiety. They, however, gave careful consideration some months ago to the whole question of their fuel supplies and to the possible developments that might arise, with the result that they made steady and gradual preparations for eventualities. Although these preparations necessarily meant some additional charge to their expenses, they had not had to pay panic prices for their special coal reserves. For reasons that they would readily appreciate, he did not consider it politic that he should disclose details of their exact position, and he trusted they would be satisfied with his assurance that they had made ample provision for the maintenance of their supply of electricity in Chelsea for a long period. One result of the labour troubles that was very possible, was an increase in the price of coal. Metal-filament lamps were now very generally in use by their customers. It was probable that the reduction in the price of these lamps, and the placing on the market of lamps of lower powers, might lead to a still more widespread use of this class of lamp. They were always keeping this point in mind and carefully watching developments; but he was very confident that the progressive increase in the use of these lamps would be gradual, and that it would not adversely affect their business. Electric lighting with metal filament lamps was now so cheap that the public had become accustomed to a higher standard of lighting generally, and they would not want to revert to lamps of such low lighting power as were used to a considerable extent some years back. The great cheapening in the cost of electric lighting had also led to its general use in the basements and servants' quarters in private houses, as well as in small premises, where formerly it was looked upon as somewhat of a luxury. With regard to the sale of electricity for uses other than lighting, such as for heating purposes, for use with cooking accessories, electric irons, ventilating fans, and for general power purposes, they continued to make steady progress. The number of units sold for use in this manner increased from 687,961 in the year 1910 to 797,781 last year, the corresponding increase in revenue amounting to £270. They kept their customers constantly informed of any progress which was made in apparatus for electric heating, cooking, and other special purposes, and their staff were always at their service to give information and advice on these points as well as on all electric lighting matters. They had increased their investments by £17,000, bringing them to over £44,000 in first-class securities. There were some signs that a fair amount of rebuilding was now not far off. Some of the poorer class of buildings had already been demolished, leaving space for the erection of better class residences, and, with leases now falling in, the possibilities of the expansion of their business were by no means exhausted. They would have noticed that the L.C.C. had appointed a Committee to report on the position of the supply of electricity in London, and their deliberations might be expected to extend over a considerable period. Meanwhile the companies and the municipalities had not been idle, but their inquiries had been protracted owing to the complicated nature of the problem both from an engineering and a financial aspect. As far as that company was concerned they were not producers in bulk, and he could only repeat what he had said formerly, that they were prepared to avail themselves of a bulk supply whenever it should become commercially practicable.

Major W. F. Wood seconded the motion, and it was carried without discussion.

The retiring director, Major Wood, was re-elected.

South Metropolitan Electric Light and Power Co., Ltd.

The meeting of this company was held on the 26th ult. at Winchester House, E.C., Mr. H. St. John Winkworth presiding.

The Chairman said it was with greater satisfaction than for some years past that the directors laid before them the accounts for the year. The units sold amounted to 4,855,580, an increase of 15·4 per cent. Every branch of their business showed improvement, and there had been a considerable increase in the use of electricity in the home for purposes other than lighting. In the revenue account they had for the first time put the figures for the previous year for comparison. The sales of electricity produced £47,636, an increase of £5,987, or 14·37 per cent. The total gross revenue amounted to £51,613, an increase of £6,926. On the other side, coal cost £1,036 more, the greater part of which was accounted for by the extra work done, and the remainder was due to special expenses incurred in increasing their stock of coal last summer. They had been accumulating a large stock of coal on their vacant land at Blackwall Point, and had now sufficient in hand for about 10 or 11 weeks' supply. There were small increases in oil, waste, salaries of engineers and wages in generation, but wages in distribution were a little less, as the meter-readers were transferred in September last to the commercial side and their wages now figured in the management expenses. On repairs and maintenance they spent £1,978, an increase of £740, which included the cost of several renewals and improvements carried out during the year. Management expenses were about 10 per cent. larger, on account of the increase of work done. Development expenses were a little less, due to the large and increasing business at the company's showrooms, which had enabled them to considerably augment their outside staff, and at the same time reduce the net cost of development. The total expenditure he had dealt with amounted to £20,541, representing 39·8 per cent. of their gross receipts, or about the same as for the previous year. The cost per unit sold amounted to 1·01d., the same rate as for the previous year. They had net revenue £31,072, or £4,063 more, which represented a return of 5½ per cent. on the average capital expenditure, as compared with 4·91 per cent. for the previous year. Capital expenditure had been restricted as much as possible. The principal items were for mains £11,516, transformers and sub-stations £1,194. About £3,000 was the balance of cost of laying down the extra-high-tension system to Catford, which had now been in operation over eighteen months, and continued to give satisfaction. On machinery and plant £2,440 had been expended, principally for the cost of laying a new 42-in. pipe into the river. Machinery and plant had been credited with £6,500, being the cost of the two Clench engine sets, which were removed during the year. The total expended during the year on capital account was £18,621, and after deduction of the amount written off, the net addition was £12,021. The depreciation account had been debited with the £6,500, and credited with the amount realised by the sale of the old plant. The space occupied by the Clench sets was now available for the installation of further plant, and in order to meet the growth of the business—the kilowatts connected having increased from 7,281 to 8,056 during the year, which would be substantially increased during the current year, several important orders having been received which were not yet connected—the directors had decided to order a new 1,500-kw. turbine, which, with the necessary boilers, switchboard, &c., was estimated to cost about £16,000, payable during the present year and next year. The estimated ordinary expenditure for 1912 would be about £10,000. The business of the West Kent Electric Co. was being steadily developed. Although the profit on sales for the first complete year to December 31st last was not quite sufficient to cover the whole of the expenses, it was hoped that they would be able to earn a reasonable profit for the current year. Arrangements had been made for giving a supply at North Cray, and negotiations were proceeding with the view to affording a supply of power and light at St. Mary Cray, Orpington, Crayford, West Wickham, and other places. The 35-watt equivalents showed an increase of 22,145, which was the largest increase they had had, if they excepted the year 1904, when the undertaking of the Crystal Palace and District Co. was taken over. The new lamp points connected were 13,198, as compared with 10,309 for the previous year, an increase of about 28 per cent. Extension orders during the year reached the gratifying figure of 423, an increase of 25 per cent. over the previous year. This was a promising feature of the business, affording increased revenue without additional capital expenditure. The business at the showroom had been organised so as to retain the goodwill of contractors working in the district, and the convenience to consumers, and prospective consumers, of being able to get reliable fittings and apparatus on the spot at a very reasonable cost, had been much appreciated, upwards of 2,750 transactions having taken place during the year. Efforts are continually being made to popularise the light, the cost of which was now found to be in many cases less than the cost of lighting by gas. Every year it became the more general practice for builders to wire new houses for electric light, and leave everything in readiness for incoming tenants, and owners of empty houses were gradually beginning to see that the installation of the electric light assisted them in securing new tenants. During the past year building in the company's area had been practically at a standstill, but the prospects for the present year showed signs of considerable development. The company's outdoor staff had been still further strengthened, and an active campaign was being pursued. The orders received during the present year substantially exceeded those for the corresponding period of last year, and the outlook for the future was very promising. At any rate, provided good sense prevailed in the coal-mining industry, he saw nothing to prevent the steady increase in their receipts which was up to that day continuing.

Mr. H. W. Bowden (managing director and engineer-in-chief) in seconding the resolution, said that last year he referred to the equipment and completion of the extra-high-tension scheme, which he was pleased to say was working well. The cables served their largest sub-station at Catford, where the load had steadily increased from 700 kw. to about 1,000 kw. The sub-station supplied the more congested areas of the Lewisham district. In regard to their distribution system, the efficiency had improved from 75·9 per cent. to 77 per cent. The higher efficiency was partly accounted for by the greater demand for power units within a short radius of the works, but it also showed that the extra new high-tension scheme was working efficiently. The output on feeders (*i.e.*, at the power house) had increased from 5·54 million units to 6·3 million units, or approximately ¾ million units. The increase for this year to date was 26·1 per cent. For the corresponding period last year 6·6 per cent. In regard to their cost of working, they compared favourably with any London company, although their output was only ⅓ that of some of the larger undertakings. Their coal per unit sold was 35d., compared to 34d. The slight increase was partly accounted for by the higher price of fuel, and partly by the larger proportion of reciprocating plant (which was the older plant) being in commission during the year owing to the increasing demand for power. The other items under works costs remained the same. At the last meeting a shareholder asked if he could

give a comparative table of costs, which, with their permission, he would do. In this table he referred to the companies in numerical order, the undertaking having the lowest total cost being No. 1, and where the figures for the year 1911 were not available, he had taken the figures for the previous year. The table was as follows:—

	Output in million units.	Total cost per unit.
No. 1 Co. London Electric Co., with a railway load ...	21	·82d.
„ 2 Co. The South Met. Co.	4·8	1·01
„ 3 Co.	4·1	1·03
„ 4 Co.	25·2	1·08
„ 5 Co.	25·7	1·12
„ 6 Co.	16·9	1·18
„ 7 Co.	9·9	1·39
„ 8 Co.	18·9	1·52
„ 9 Co.	12·2	1·53
„ 10 Co.	6·0	1·76
„ 11 Co.	4·1	1·79
„ 12 Co.	2·2	2·08
„ 13 Co.	2·6	2·19

The table showed that their company occupied the second place, with an output of less than one-fifth of that of the large undertakings. Quite recently he had visited some of the most modern and up-to-date power houses in this country and on the Continent, and he had no hesitation in saying that for their output they were keeping well abreast of the times. In regard to the lighting, perhaps the most encouraging result for the year was the large increase in new customers and extensions on the existing network of cables.

Mr. Powell criticised the increase of 60 per cent. in the cost for repairs and maintenance, and asked if the engineer had fully considered the question of oil plant. If one was to believe all one heard, oil was going to knock spots off the turbine. Speaking of his own experience of the company he was connected with, they had actually put down oil plant, and when it ran, as it was hoped to in a next month or two, they expected to get infinitely better results than they were likely to get from the turbine, and certainly from steam plant. It was a question of saving £2,000 or £3,000 a year on running alone.

Mr. H. Boot thought it was time the board got a hustle on and paid a dividend. As the engineer of a station entirely dependent on the Diesel oil engine, he might say they were not altogether the wonderful blessing which the Press cracked them up to be. Like other engines they had their drawbacks, and if it did not come in fuel it came in the shape of repairs. The units they were putting down at Greenwich were of such a capacity that to put down a similar capacity in oil plant would be out of the question.

The Chairman said they all regretted that they could pay no dividend, but the conditions of the trust deed for the debenture-holders precluded them from doing so at present. He unhesitatingly said that the company had a fine future before it.

Mr. Bowden said that Mr. Boot had really answered the question about the oil engines. It was true that repairs were heavy, but they had been unusually light in past years.

The report was adopted, and the retiring directors re-elected.

Para Electric Railways and Lighting Co., Ltd.

The directors' report states that the revenue for the year to November 30th, after providing for all expenses in Para, is £115,530; adding thereto the balance of exchange, interest, and transfer fees, £7,764, and deducting therefrom London office expenses and interest and sinking fund on debenture stock, £46,886, there remains a balance of £76,409. The directors have made the following transfers to reserve accounts, viz.:—Depreciation and renewals reserve, £15 000; contingencies reserve, £10,000; leaving £51,409; add balance brought forward, £7,433, together making £58,843. An interim dividend for six months of £3 per cent. on £295,000 preference shares was paid on September 1st, amounting to £8,850; it is now proposed to pay a final dividend of £3 per cent. on £320.000 preference shares (making 6 per cent. for the year), which will absorb £9,600; an interim dividend for six months of £5 per cent. on £389,510 ordinary shares was paid on September 1st, amounting to £19,475; it is now proposed to pay a final dividend of £5 per cent. on £389,510 ordinary shares (making, with the interim dividend, £10 per cent. for the year), which will absorb £19,475, leaving to be carried forward £1,442.

The meeting was held on the 28th ult. at the Cannon Street Hotel, E.C., Sir W. Evans Gordon presiding.

The Chairman said that the reduced net earnings were wholly due to an increase in the operating expenses of £38,640. The generating station expenditure had increased by £19.498. Their business, both tramways and lighting, had increased during the year; the number of units generated was better by 30 per cent., but the cost of operating the station had increased by nearly 50 per cent. The principal cause was due to the works carried out during the year by the Port of Para. They destroyed their former facilities for landing and handling coal, and until November gave them no new facilities. They were now receiving coal over their new quay wall, not in a manner altogether satisfactory, but under better conditions than during most of the past year. The increase in business had necessitated an increase in the capacity of the plant, and they decided to take this opportunity to put out of use a portion of the least efficient of the old plant. They had already partly installed new plant of a capacity of 1,200 kw. (displacing old plant of 480 kw.). This work when completed would effect a net increase of about 25 per cent. in their station capacity. Their condensers had been replaced by others of a different and more efficient type, as well as of larger capacity, and this had also entailed new steam and exhaust piping. Within a few weeks this new plant should be in full operation, and an important part of the unfavourable condition of last year's working would be eliminated. The increase in the item of wages, salaries, &c., amounting to £11,404 was due to the fact that they were giving a much heavier service. The increase in the maintenance item amounted to 15 per cent., which might be accounted for to some extent by the increase in the business, both tramway mileage and output of power; expense under this head had, however, been abnormally increased by replacement of some cables. The general expenses had increased by £4,062. Reviewing the operating expenses, as a whole, he thought he might say that, due to several temporary conditions, the expenses of last year were abnormal, and while, on account of the rise in the rate of wages, they were not likely to fall back to quite so low a percentage of the gross receipts as obtained in 1910, they should, nevertheless, be substantially reduced in the current year. He had received a telegram from Para that morning stating that the surplus for February this year was £6,190, as against £5,365 in the corresponding month last year. The gross revenue from tramways had increased from £178,957 in 1910 to £199,116 in 1911, being an increase of 11 per cent. The gross receipts from lighting and power business had increased from £83,796 in 1910 to £89,540 in 1911, being an increase of 7 per cent. The net number of new customers connected during the year was 550, and the total equivalent of 16-c.p. lamps connected to their system had increased from 42,648 in 1910 to 50,309 in 1911, being an increase of 18 per cent. The revenue per lamp connected had fallen off somewhat, since practically all the carbon lamps had been replaced by metallic-filament lamps, but the total results of the gross revenue side had been entirely satisfactory. When he addressed them last year, he called attention to the sum standing in the profit and loss account under the heading of "Balance of Exchange." There was a similar sum in this year's accounts, slightly smaller than last year, but nevertheless substantial. This was due to their having again in the past year kept their accounts on the basis of 15d. to the Brazilian milreis, whereas the actual exchange had never fallen during the year below 16d., and they had therefore made a profit on every remittance to London. As the exchange had been officially fixed by the Brazilian Government now at 16d., and this rate had been maintained for some time, they were altering their accounts and were now keeping their books on the basis of 16d. to the milreis. During the year they spent on capital account £29,645. The principal item for which this expenditure was made was on the increase of their lighting distribution system by adding heavily both to their underground, overhead, and transformer systems. The new customers connected also necessitated a heavy increase in meters. The large addition to the power plant accounted for more than half of the total capital expenditure. The capital expenditure during the year now current would be materially smaller than last year, but so long as the company was a live and progressive one capital expenditure would continue. In view of this expenditure and the heavy expenditure during the preceding year, the directors found it necessary to issue 5,000 of the authorised £5 preference shares which had been held in reserve for this purpose. These shares were sold at a small premium, the amount of which had been deducted from the current year's capital expenditure. The company still had in reserve 14,000 of these preference shares, which could be issued when necessary to provide for future developments of the undertaking. The directors were advised that £15,000 was sufficient to set aside annually to cover renewals required from time to time in the plant of the undertaking, in addition to the numerous small renewals paid for as maintenance. All the plant was maintained in a high state of efficiency, and all ordinary minor renewals were charged directly to maintenance, but occasionally whole units of the plant wore out or became obsolete, and funds must, therefore, be provided in order to pay for these renewals when they occurred. They were further setting aside £10,000 for the contingency reserve against any possible special claims or losses in connection with the company's business. As to the future, he could only say that their plant was increased in capacity and efficiency, and it was not unreasonable to assume that the business would continue to grow with the continually improving conditions in Para.

Mr. E. C. Cheston seconded the motion, which was adopted.

British Electric Transformer Co., Ltd. — The directors' report for the year 1911, states that the result was satisfactory. The accounts show that after paying all manufacturing costs and expenses of administration there remains a net profit of £19,833, plus £1,373 brought forward, making the total available balance £21,206. The board recommend that out of this there be allocated to depreciation reserve, £1 000; to reserve account, £7,000; preference dividend of 6 per cent. for the year, £1,904; a dividend of 10 per cent. on the ordinary shares (3 per cent. of which was paid as an interim dividend on September 1st, 1911), £6,940; extra remuneration to the directors, £949; carrying forward £3,363. The annual meeting to-day will be followed by an extraordinary general meeting, at which shareholders will be asked to approve of the increase of the capital from £125,000 to £200,000, by the creation of 50,000 new 6 per cent. cumulative preference shares and 25,000 new ordinary shares of £1 each.

Waste Heat and Gas Electrical Generating Stations, Ltd.

The fifth annual meeting of this company was held on March 1st at Newcastle-on-Tyne. Mr. F. Stirling Newall, in moving the adoption of the report (see Electrical Review, p. 353) said that the total issued capital of the company was £320,000, the whole of which had been paid with the exception of a small number of calls still in arrear. The issue of new capital offered in May last was largely over-subscribed. The existing shareholders applied for more than one-half of the issue. Their shareholders had, however, increased by 425 since last annual meeting. The new capital was issued at 21s. per share, and the premiums more than paid for the cost of the issue. The capital expenditure on generating stations owned by the company now amounted to £201,752. When the new stations at Grangetown, Port Clarence, and Ayresome were completed, this amount would be increased by about £46,000, against which the directors had made advances to the extent of £27,502. The company's investments had cost £32,591, consisting of 39.996 shares of £1 each in the Bankfoot Power Co., Ltd., on 20,000 of which only 2s. 6d. per share had as yet been paid, and £10,000 of debentures in the same company. These debentures carried interest at the rate of 5½ per cent. per annum, and the shares held during the past year yielded a return of 10 per cent. There was a further amount to be paid on the 20,000 shares which had just been taken up amounting to £17,500, and after these calls had been paid the company's investments would amount to £50,091. The directors had under consideration proposals for the erection of a further generating station, but these negotiations had not yet been concluded. They had transferred the sum of £7,500 out of the profits of the year to the reserve and depreciation account, and they had also transferred to this account the premiums received on the new issue of capital after deducting the expenses of the issue, and the reserve account now amounted to £24,351. There was a reference made in the report to certain exceptional expenditure at the Weardale generating station. This was the result of some slight subsidence necessitating rather expensive repairs to some of the plant. The amount of this expenditure, if any, which might have to be borne by the company, was not yet ascertained, but the directors had considered it wise to make provision against any indirect expenses which might fall on the company and not be recovered. The whole of the stations in operation had been maintained in thoroughly efficient repair by the electric power companies under the terms of the contracts under which they worked the stations for them. He was pleased to report that the arrangements they made with the owners of waste heat on the one side and the electric power companies on the other, were more and more appreciated as time went on. Owners of waste heat, who had thought it would be more profitable to erect a generating station for themselves than to make an agreement through them with the electric power company, had found that considerably more capital had to be expended in order to obtain a proper stand-by supply, and had in the end approached them with a view to getting rid of the surplus electrical energy which they could not themselves use. Under their company's agreements, the whole of the electricity which was generated from the waste heat or gas, as the case might be, was disposed of, and the profit to the waste heat owner was thereby considerably increased, while he also obtained a reliable stand-by supply without the expenditure of any capital. The national coal strike had now actually begun. It would, of course, affect the company, as they derived their waste heat from coke ovens and blast furnace works which would all stop working, but they hoped sincerely that the stoppage would not be of long duration.

Mr. E. Lloyd Pease seconded the adoption of the report, and it was carried unanimously. The dividend resolution was also passed.

City of London Electric Lighting Co., Ltd.

The report of the directors for 1911 says that the capital expenditure upon additions, extensions, and replacement, was £45,814, making £2,467,909. less the amount written off prior to December 31st, 1910, £274,670; and further amount written off in respect of buildings, plant, and other works dismantled during 1911, £47,274; making the net expenditure as at December 31st, 1911, £2,145,966, showing a net deduction from capital account during 1911 of £1,460.

The first debenture stock premium redemption account has been credited with £1,441 from revenue for interest, raising the amount at the credit of redemption account to £61,485. £50,000 has been transferred from net revenue account to reserve account. The balance at credit of reserve account stands at £269,291. In addition there are:—First debenture stock premium redemption account, £61,485; leasehold redemption account, £4 253; standing reserve for doubtful debts, &c., £2,155; dividend equalisation account, £14,000; amount to be carried forward to 1912, £25,943: making the total reserves, £377,127.

The total revenue for the year was £289,105, plus interest on investments and discounts, £2,480, making £291,585. From this are deducted the following:—Expenses of generation and distribution, £64,666; repairs and maintenance of buildings, machinery, plant, mains and other works, £11,117; rent, rates, taxes, management expenses and special charges, £53,935; leaving £161,867, plus £27,656 brought forward, making £189,523. Of this sum there have been distributed or provided for:—Interest on loan from bankers, consumers' deposits, &c., £3,032; interest on first and second debenture stock for the year, £31,546; interest transferred to debenture stock premium redemption account, £1,441; leasehold redemption account, interest and appropriation, £260; staff superannuation fund, £387; stores written down, £960; loss on sale of investments, £172; transfer to reserve account, £50,000; leaving available for dividends on preference and ordinary shares and for carry forward, £101,725. The total dividends for the year:—Six per cent. on the preference shares and 8 per cent. on the ordinary (compared with 7 per cent. for 1910) require £75,782, leaving to be carried forward £25,943. The following are the comparative statements:—

Revenue.	Dec., 1909.	Dec., 1910.	Dec., 1911.	+ over 1910.
Gross revenue ..	£288,161	£282,129	£291,584	£9,455
Net revenue	160,656	156 755	161,866	5,111
Div. on ord. shares..	7 %	7 %	8 %	—

Private supply: average price obtained:—

1905.	1906.	1907.	1908.	1909.	1910.	1911.
2·78d.	2·67d.	2·69d.	2·55d.	2·49d.	2·45d.	2·39d.

The following show the total number of customers and connections (private supply) after allowing for disconnections on account of removals, substitutions of metallic-filament lamps, &c.:—

	1909.	1910.	1911.	+ over 1910.
Number of customers	13,338	13,876	14,246	370
KW. connected (incldg. power and htg.	35,915	37,127	39,122	1,995

On February 14th, 1912, there were 40,127 KW. applied for, 39,387 connected, and the customers numbered 14,318. The following are the total units (including public lighting):—

	1910.	1911.
Generated	28,989,348	30,527,715
Sold	25,183,380	26,633,759
Metered and used by company	1,022 259	1,183 635
Expended in distribution	2,827,407	2,710,331
Maximum supply demanded, KW.. ..	17,767	17,762

The total units sold during 1911 show an increase of 1,450 379.

The power and heating supplies continue to show a steady increase, the total sold for these purposes in 1911 being:—Power, 8,397,066 units; heating, 1,673,072 units = 10,070,138 units, equal to 39·6 per cent. of the total units sold for private supply.

The tender of the company to continue the lighting of approximately the same streets as hitherto for a period of 10 years, but on a revised scale of rates, has been accepted by the Corporation. The fixing of this definite period will enable the company to inaugurate an improved system of lighting. It is hoped that the economies which the modern system may render possible will assist in counterbalancing the reduction in the gross revenue due to the revised rates. The board have agreed to regard the acceptance of the new tender as being in substitution for the contract for the eastern district of the City, as to the validity of which a difference of opinion existed between the Corporation and the company. Considering all the circumstances, the directors regard the new arrangement made with the Corporation as satisfactory. A very large stock of coal has always been maintained at Bankside Works, as one of the most necessary precautions against any interruption in the supply of energy.

To provide against the eventuality of a coal strike additional storage space has been filled with coal so that the stock is now sufficient for the full requirements of the works for some months to come, even assuming that all further deliveries of coal were stopped. In addition oil fuel is held in reserve. This position has given great satisfaction and confidence to some of the largest customers who visited the works to assure themselves of the company's ability to cope with any difficulty which might arise. The Corporation of London (Bridges) Act, 1911, when originally deposited as a Bill, interfered with the company's property. As a result of negotiations with the Corporation a special clause for the protection of the company has been embodied in the Act, which, amongst other things, provides for the exchange of certain specified lands, which, when carried into effect, should improve the site of the company's works.

The meeting is called for Wednesday, March 13th.

Charing Cross, West End and City Electricity Supply Co., Ltd.

The directors report that the result of the year's working has been satisfactory. The gross earnings of the West End undertakings from sales of current, rents, &c., were £140,922 in 1911, as compared with £142,675 in 1910. The expenses, including depreciation, were £80,408, as compared with £83,688, and the net earnings were £60,514, as compared with £58,988. Including £9,954 brought forward and £1,311 for interest, and paying interest on the debenture stock, there is a balance on net revenue account of £53,949. out of which have been paid the dividend for the year on the preference shares, amounting to £18,000, and an interim dividend for the first half-year at the rate of £5 per cent. per annum on the ordinary shares, amounting to £10,000, leaving £25,949 to be dealt with. A final dividend is recommended on the ordinary shares for the second half-year at the rate of £5 per cent. per annum, making £5 per cent. for the year, absorbing £10,000, carrying forward £15.949, as against £9,954 carried forward last year. The company has now connected to its West End mains a total equivalent of 650,386 8-C.P. (or 30 watt) lamps. The total is made up as follows:—444,723 in lighting, 21,757 in heating, and 182,536 (7,301 H.P. = 5,476 KW.) in motive power, and 1,370 bulk supplies.

The gross earnings of the City undertaking from sales of current, rents, &c., were £145,072 for 1911, as compared with £141,476 for 1910. The expenses were £84,356 for 1911, as compared with £82,741 for 1910, and the net earnings were £60,716, as compared with £58,735. Including £23,576 brought forward and paying interest on the debenture stock, loans and advances, there is a balance on net revenue account of £54,158, out of which has been paid the dividend on the preference shares amounting to £18,000, leaving to carrying forward £36,158, as compared with £23,576. The company has now connected to its City mains the total equivalent of 625,865 8-c.p. (or 30 watt) lamps:—324,144 in lighting, 41,933 in heating, and 246,488 (9,859 h.p. = 7,395 kw.) in motive power, 13,300 in bulk.

The chief engineer certifies that the plant and machinery at the several stations of the company have been maintained in a high state of efficiency. The advisability of giving up the Lambeth station has been under consideration for some time, and when the lease expired in 1910 it became the duty of the board finally to decide upon the course to be adopted. If the Lambeth station had been retained it could only have been at a considerably enhanced rent. On the other hand, it was found that by expending a moderate amount of capital in the acquisition of modern machinery, sufficient plant to replace that at Lambeth could be erected at the existing sub-stations of the company. The board accordingly decided to give up the Lambeth station, as by adopting this course the rent and expenses of the station would be saved, and the use of more economical machinery secured. This decision has of necessity involved the writing off of a large sum out of the reserve and depreciation accounts, but the company has already derived considerable advantage from the change, and the board look forward to increased benefits in the future.

The meeting is called for Tuesday, March 12th.

	West-End undertakings.	City undertaking.
Units generated	7,302,671	30,177,604
Units bought	11,280,388	2,069,311
Units sold—Public lamps	440,940	—
Other sales	13,161,681	—
Total	13,602,621	26,865,277
Used on works, and transmission and distribution losses	4,980,438	5,381,638
Total accounted for	18,583,059	32,246,915
Public lamps	166	—
Total supply demanded, kw.	6,317	12,062

Kensington and Knightsbridge Electric Lighting Co., Ltd.

Colonel R. E. Crompton, C.B., took the chair at the meeting of this company, held at 148, Brompton Road, S.W., on February 29th.

The Chairman, in moving the adoption of the report (see Electrical Review, page 309), said it gave the shareholders the amount available for dividend and the amount they had now accumulated as a reserve and renewal fund, which was considerably in excess of their ordinary share capital, which, he hoped, they would think very satisfactory. The output of the year had slightly decreased. They had sold about a quarter of a million units less than last year, but this need not alarm them, because the decrease was due to the cessation of the contract for the supply of power to the contractor who was constructing the tunnel for the London County Council in their district, and which lasted for two years, and might be looked upon more or less as a windfall during the time it lasted. Apart from this, the figures for light and power in the district showed an increase—not a large one, but it was steady. Filled as their district was, any increase could only be looked forward to where there was rebuilding of premises, and in the increased use of electricity for purposes other than lighting. The increase which had taken place was, therefore, satisfactory, and it was due to the considerable improvements that had taken place in the apparatus for utilising electricity in a residential district, such as cooking, heating, and, last of all, the cleansing of premises by means of vacuum apparatus. At any rate, their officials told them that the prospects of future increase in this direction were very hopeful, and that in future years they might fairly count upon reducing the proportion which the fixed expenses bore to the total output. With regard to the introduction of the metal-filament lamp, which a year or two ago they looked upon with some dread, they now found that they had passed the crucial period and the probability was that it would be an unmixed benefit to them. It was practically certain that the sale of light demanded by their consumers was altogether on a higher plane than it used to be, and none of them would like to go back to the scale of lighting which they were content with in the days of the old carbon lamp. The total income for the year was £80,729, or about £1,500 less, but he would at once call their attention to the fact that on the expenditure side it showed that the reduction of income was more than met by the reduction they had succeeded in obtaining in the items of rates and taxes and landlords' charges. The high figure at which these items had stood in the past had been a source of anxiety to the directors, and it was only this year that he was able to point to a reduction. The reduction, however, had not yet reached the figure to which they hoped to attain. The cost of generating electricity, both at their own station and at the joint station at Wood Lane, remained practically the same as last year, and it would be unreasonable to expect that these costs could be reduced to any considerable extent, as the stations were as efficient as it was possible to make them, and compared favourably in that respect with any plant in London. Therefore, any future reduction in the total cost of generation could only come from a better load factor. The balance carried to net revenue account was £26,821, as compared with £25,786 last year. The total expenditure on capital account had been £386,000, so that they had expended £91,549 in excess of the total capital, and, of course, this sum was represented by their reserve and renewal fund. The change over to the full pressure of 400 volts was about two-thirds complete, and until it was complete they would not get the full advantage of reduced cost. He supposed he would be expected to make some remarks about the coal question, and he thought they would be more favourably situated than some other people. They had eight weeks' supply at their ordinary rate of use of their coal. Another point on which, no doubt, they would expect him to say a few words was the recent accident they had had with their mains. It was an accident of very considerable extent, and might have been a very costly one to shareholders, and they were tremendously indebted to the mains staff for the prompt way in which they met the difficulty and minimised the inconvenience of their customers; and they had also to thank the consumers for the great consideration they showed the company. He was glad to say they had received practically no complaints, although, no doubt, their consumers were put to great inconvenience. He had been congratulated by brother chairmen and engineers of other works in London upon the highly successful way in which it was met by their staff. They did not know the cause, and it probably was the usual joint cause—an escape of gas affecting their mains. But whether it was due to the fault of the gas company or some deterioration in their own mains, or whether it was due to the interference of the Post Office people in laying their cables, they did not know, and probably never would know. These accidents often had the effect of concealing themselves, as the later explosions and other things which took place obliterated the traces of the first short-circuit. It was sufficient to say they had come out of it very well, and the cost had been low—about a tenth of what he estimated when the thing was going on. He need hardly say that it was a source of intense anxiety to everyone concerned, and they were very glad when it was all over.

Mr. R. Wallace, K.C., seconded the motion.

Mr. Makins suggested that in the accounts the figures of the previous year should be put down so that shareholders might see where the differences were. He would like to know the cost of the accident referred to.

The Chairman said the board would bear the suggestion in mind. The cost of the accident was so inconceivably small that at the moment he dare not quote it, in case there was still more work to do than they thought there was.

Mr. Makins compared the accounts of the Chelsea Co. and the Kensington Co. at some length, and suggested that the cost of management in their company was considerably higher than in the Chelsea. He also thought that the auditors should make a note of the fact that the reserve fund was invested in the business.

The Chairman, in reply, said that if Mr. Makins examined an analysis of the accounts of the two companies, he would find that their management expenses were smaller than those of the Chelsea. With regard to the investment of the reserve in the business, the shareholders would benefit when the London County Council came to purchase the undertaking, inasmuch as it would be purchaseable at its value.

The report was then adopted.

On the motion of the Chairman, seconded by Sir H. Bliss, a dividend for the half-year of 5 per cent., making 9 per cent. for the year, was agreed to.

County of London Electric Supply Co., Ltd.

The directors report that the capital expended during the year 1911 on account of London districts was £49 646, making the net total expenditure for those districts £1,813,746. The balance brought forward was £1,358, and the balance from revenue account for the year, after deducting generation and distribution costs, rents, rates, taxes, wages, directors' fees, general establishment and other charges, and proportion of salaries, was £126,228, making £127,586 available. Of this, interest on the first and second debenture stock (including stock sold during the year) and interest on temporary loans to December 31st, 1911, less income-tax, absorb £45,779, and there is carried to reserve for depreciation, repairs, renewals, &c., £25,000, leaving the balance for distribution for the year at £56,807. Interim dividends on 55,000 6 per cent. preference shares and on 40,000 ordinary shares at the rate of 4 per cent. per annum, for the half-year ended June 30th, 1911, less income-tax, were paid, absorbing £23,071, and leaving for further distribution £33,736. The directors now recommend a further half-year's dividend on the 6 per cent. preference shares, and a further dividend on 40,000 ordinary shares for the half-year ended December 31st, at the rate of 8 per cent. per annum, less income-tax, these absorbing £30,604, and leaving £3,132 to be carried forward.

The applications received during the past year were equivalent of 3,484 kw., making 41,339 kw. The total units sold were 20,450,787, as against 16,985,687, an increase of 3,465 100 units, or 20 per cent. The number of consumers increased during the year from 16,883 to 18,459. The balance of the first and second debenture stock has been disposed of during the year. Under the powers conferred by the London Electric Supply Act, 1908, the work of interconnecting the company's power houses at Wandsworth and Finsbury has been carried out during the year, thus giving the company's consumers additional security for the continuity of their supply, and enabling the company to make more economical use of the generating plant installed in the two power houses. During the past year the City and South London Railway has been connected to the company's mains, and supply is now available. In view of the crisis in the coal trade, the directors have made arrangements for the storage of an extra quantity of coal, to ensure continuity of supply in the event of a strike taking place. The

board announce that, after long and careful consideration, they have been able to arrange, through one of the leading life assurance companies, for a scheme of staff superannuation, on the basis of the company contributing thereto in proportion to the salary of each member coming under the scheme, and all members of the staff have availed themselves of the opportunity thus afforded them. The directors of the Bournemouth and Poole Electricity Supply Co., Ltd., have declared a final dividend on the ordinary shares at the rate of 6 per cent. per annum, making 5½ per cent. for the year. The business of the Coatbridge and Airdrie Electric Supply Co., Ltd., shows satisfactory progress. There is an increase of 888 KW. applied for, and an increase of 846,292 in the units sold, raising the total sales to 3,538,320 units, as against 2,692,028 units in 1910.

The directors have unanimously elected Mr. H. B. Renwick, previously general manager and secretary, to a seat on the board, and have further appointed him managing director. Mr. F. C. McQuown, previously assistant secretary, has been appointed secretary.

The meeting is called for Monday, March 11th.

Units generated	27,368,728
Units sold—Private consumers by meter	20,450 787
Total	20,450 787
Used on works	2,464.654
Total accounted for	22,915.441
Not accounted for	4,448,287
Total max. supply demanded	11,7000 KW.

Bournemouth and Poole Electricity Supply Co., Ltd.

THE directors' report for 1911 states that the capital expended during the year on account of the Bournemouth Order, 1890, the Poole and Branksome Order, 1897, the Christchurch and District Order, 1899, and the Pokesdown Order, 1902, amounted to £7,749, making the total £460.206. The balance brought forward from 1910 was £1,400, and the balance from the revenue account for 1911; after deducting generation and distribution costs, rent, rates, taxes, wages, directors' fees, general establishment and other charges, and proportion of salaries is £35,441, making a total of £36,841 available. From this there is deducted interest on debenture stock and interest on temporary loans, less income-tax, £8,876; leasehold and special redemption funds and interest, £1.697; amount written off suspense accounts, £637; amount carried to reserve for depreciation, &c., £5,000; leaving the balance for distribution for the year £20,631. Interim dividends on the 4½ per cent. preference shares, on the 6 per cent. second preference shares, and on the ordinary shares at the rate of 5 per cent. per annum for the half-year ended June, less income-tax, amounting to £9,358 have been paid, leaving for further distribution £11,273. Final dividends on the 4½ per cent. preference shares and on the 6 per cent. second preference shares for the half-year ended December, less income-tax, have also been paid. The directors now recommend a final dividend on the ordinary shares for the half-year ended December at the rate of 6 per cent. per annum, less income-tax. The above final dividends absorb £10,064, and leave a balance of £1,209 to be carried forward.

The total applications received at December 31st last amounted to 7,632 KW., an increase of 535 KW. for the year. The total units sold for all purposes were 3,078,316. The directors of the Richmond (Surrey) Electric Light and Power Co., Ltd., have declared a dividend of 6 per cent. on the ordinary shares for the year. The board have arranged through one of the leading Life Assurance Companies, for a scheme of staff superannuation on the basis of the company contributing thereto in proportion to the salary of each member coming under the scheme.

Units generated	3,808,862
Quantity sold—	
Public lamps	22,750
Private consumers by meter	3,055 566
Total sold	3,078,316
Used on works	392,208
Total accounted for	3,470.524
Not accounted for	338,338
Public lamps	129
Total maximum supply demand, KW.	2,282

Harrow Electric Light and Power Co., Ltd.

IN their report for 1911 the directors state that during the year 72 new consumers, representing 22 KW., have been connected, the consumers at the end of the year being 1,381, representing 1,213 KW. The economy which consumers have effected in the consumption of electrical energy by the use of the metal lamp, has again reduced the sales in a large number of cases, but notwithstanding this the output shows an increase of 35,928 units, the total amounting to 457,489 units. There is a balance of £1,400 of the 4½ per cent. debentures still available for issue, and applications from shareholders, debenture-holders, and consumers, are invited. The balance to the credit of the net revenue account, after deducting debenture interest and the interim dividend on the preference shares, is £2.265. Out of this the final dividend on the preference shares requires £375, a dividend is to be paid on the ordinary shares at the rate of 5 per cent. per annum requiring £1,667, and £223 is to be carried forward. The directors have provided out of the year's profits £2,500 for depreciation purposes. A site in College Road has recently been secured for the new offices and showrooms which will be erected shortly. The provisional order to extend the area of supply as confirmed by Parliament under the title of the Harrow and District Electric Supply Order, 1911, relates to portions of Wealdstone adjoining the Harrow area, the supply of electrical energy to which can easily be furnished from the company's existing generating station.

MR. J. N. STUART, who presided at the meeting held on February 22nd, said that the total revenue had, for the first time, reached £10,000. They were now feeling greatly the effect of the increasing use of metallic-filament lamps. An analysis of the accounts of about 200 consumers, who had been chosen as typical regular consumers, showed that they had paid the company £500 less than in the previous year. While regretting the reduction in the revenue, the directors were quite content to have it so, for the cheaper the light, the more popular would it become. In regard to their proposed new premises, it was hoped that a good showroom in a central position would enable the company to demonstrate to the public the great advantages of the use of electricity in a way they had not been able to do before. In regard to the coal strike, they had a sufficient stock of coal to carry on for seven or eight weeks. That was as much as they could find room for, and they had to make special arrangements to find space to stock such a large quantity—over 300 tons.

British Engine, Boiler and Electrical Insurance Co., Ltd.—We are informed that, at the annual meeting of the shareholders, held at the offices, Manchester, on March 1st, the chairman (Mr. Longridge) remarked that, while increased competition from accident insurance companies had not interfered with the usual steady increase in the volume of business, the claims for the year 1911 had been abnormally heavy. This was not to be accounted for either by lack of vigilance in the selection of risks or by diminished efficiency in the matter of inspection, and though he might be accused of frivolity in making the suggestion, he was inclined to think that climatic conditions affected the result. It was an admitted fact that boiler claims were unusually heavy in a year when there was a dry summer and the supply of feed water was deficient both in quality and quantity. It was not so easy to trace a connection between the weather and the breakdowns of either engines or electrical plant except that a sudden frost such as had recently been experienced would certainly increase the claims for breakdowns among gas engines, but, be the cause what it might, the claims ratio for 1911 had been unusually high. The percentage of breakdowns among insured plant did not vary much, and it was higher than either owners or makers were disposed to admit, but with the spread of the company's business, their costs, both for periodical inspections and for the supervision of repairs, were proportionately reduced. Out of the disposable balance of £17,025, it was proposed to carry £7,000 to reserve fund, to write off £250 from furniture and instruments, and after declaring a dividend of 5s. per share, with a bonus of 3s. per share (less income-tax in both cases), there would be £2,091 to carry forward to next account.

Northallerton Electric Light and Power Co., Ltd.—The annual meeting was held on 28th ult., Mr. John Hutton presiding. The chairman said that the past year had been fairly satisfactory. They proposed to carry their net profit (£318) to the reserve fund to provide for depreciation and further capital expenditure. They had ordered a Diesel engine, which they believed would be of great service to the company and a great economy in producing the current. An agreement had been made with the Urban Council for the public lighting of the town for a period of five years, which was satisfactory, as the question of that contract from year to year was a matter of anxiety without such an agreement. The arrangement they had made with Messrs. Baillie and Dobree to act as consulting engineers had been very satisfactory and of great assistance to their resident engineer-manager, Mr. H. W. Milnes. The chairman referred to the excellent manner in which Mr. Milnes had conducted the management of the business. They were steadily increasing their consumers and their profit, and they were within sight of becoming a good dividend-paying company.

W. T. Henley's Telegraph Works Co., Ltd.—The directors' report for the year 1911 says that the accounts show a net profit of £83.831. After payment of directors' and auditors' fees, and debenture interest, and making allowance for depreciation of buildings, plant, machinery, &c., there remains £62,704, making, with £27,311 brought forward, a total of £90,015. After adding £2,403 to the reserve in respect of depreciation of Consols and other trustee securities (bringing that amount up to £8,797), the directors have transferred £10,000 to the general reserve account, and they recommend the payment of a dividend on the ordinary shares of 15 per cent., free of income-tax, of which an interim dividend of 5 per cent., free of income-tax, was paid on September 1st last. These payments will, together with the preference dividend for the year, amount to £53,153, leaving a balance of £36,862 to be carried forward. The dividend warrants for the ordinary shares will be posted on March 11th. The directors record the death of Right Hon. Sir Alfred Comyn Lyall, K.C.B., G.C.I.E., and they have elected to fill the vacancy Mr. R. J. Hatton, M.I.Mech.E., M.I.E.E., who has been for many years chief engineer of the company. Mr. Martin Roberts and Mr. R. J. Hatton come up for re-election. The meeting is called for Monday, March 11th.

Aberdeen Suburban Tramways Co.—Mr. George J. Walker, presiding at the half-yearly meeting of this company, said that the profit earned for the half-year ending January 31st, amounted to £1,419, which was larger than the profit for the corresponding period last year. The total sum in the meantime standing at the profit and loss account was £2,130, which the directors recommended should be carried forward as usual. The report was adopted.

ELECTRIC TRAMWAY AND RAILWAY TRAFFIC RETURNS.

Locality.	Fortnight ended.	Receipts for the fortnight. £	Receipts for the fortnight. £*	No. of wks.	Total to date. £	Total to date. £*	Route miles open.	Route miles open. Inc.
Aberdeen	Feb. 28	2,718	+ 150	80	58,282	+ 3,405	14·4	..
Ayr	Mar. 2	3 3	— 2	2	12,713	+ 1·7	8	..
Bath	Feb. 27	1,406	+ 103	9	6,008	+ 211	14·75	..
Birkenhead	Mar. 3	2,2·7	+ 175	48	55,018	+ 2,054	13·68	..
Birmingham Corp.	Feb. 24	20,815	+6,887	47	4 1,132	+94,798	56·4	..
Blackburn	„ 28	2 115	+ 193	48½	55,4 1	+ 4,879	14·69	..
Blackpool Corp.	„ 29	921	— 45	..	62,893	+ 7,885	11·87	..
Blackpool-Fleetw'd	Mar. 4	571	+ 46	8	2,305	+ 119	8	..
Bournemouth	Feb. 28	2,151	+ 264	48	84,629	+ 1,111	21·25	..
Bradford	„ 24	10,861	+ 665	47	55,678	+15,431	56	1·2
Brighton	Mar. 3	1,592	+ 63	48½	48,957	+ 2,698	9·5	..
Bristol	„ 1	12,274	+1,188	9	54,0:6	+ 4,821	30·5	..
Brit. Elec. Trac. Co.								
Airdrie	Feb. 28	586	+ 124	8	2,100	+ 461	3·65	..
Barnsley	„ 23	400	+ 50	„	1,422	+ 140	..	..
Barrow	„ 28	624	+ 144	„	2,818	+ 525	5·87	..
Devonport	„ 23	975	+ 156	„	3,747	+ 512	8·85	..
Gateshead	„ 2?	2,084	+ 39	„	7,7 8	+ 113	11·25	..
Gravesend	„ 23	397	+ 45	„	1,5 1	+ 167	6·5	..
Greenock	„ 2?	1,4 5	+ 234	„	5,205	+ 704	7·25	..
Hartlepool	„ 23	488	+ 54	„	1,772	+ 171	6·72	..
Kidderminster	„ 23	196	+ 27	„	684	+ 68	..	..
‡Leamington	„ 23	286	+ 26	„	1,051	+ 73	..	..
Merthyr	„ 2?	39?	+ 10	„	1,4 0	+ 7?	2·9	..
Metropolitan	„ 23	15,7·2	+1,501	„	62,405	+ 5,552	22	..
Middleton	„ 23	572	+ 16	„	2,0·9	— 31	8·5	..
Mid. Joint Com'tee	„ 23	6.219	+ 449	„	22,182	+ 541	..	..
Oldham—Ashton	„ 23	1,107	+ 70	„	4,027	+ 216	9·13	..
Peterborough	„ 23	238	+ 4?	„	865	+ 125	5·31	..
Potteries	„ 23	4,666	+ 322	„	15,013	+ 790	29	..
Rothesay	„ 23	9?	+ 18	„	384	+ 51	2·75	..
Southport	„ 2?	4·7	— 18	„	1,720	— 18	8·17	..
S. Metropolitan	„ 23	1,4 6	+ 49	„	5,2·6	+ 100	..	..
Swansea	„ 28	2,1 4	+ 105	„	8,572	+ 430	12·5	..
Tynemouth	„ 28	274	— 14	„	1,021	— 85	3·75	..
Weston-s-Mare	„ 23	54	+ 20	„	200	+ 74	8	..
‡Worcester	„ 28	482	+ 96	„	1,790	+ 51	5·75	..
Wrexham	„ 2?	187	+ 17	„	706	+ 46	..	..
Yorks. Wool. Dist.	„ 23	2,087	+ 145	„	7,83?	+ 219	17	..
Miscellaneous	„ 23	403	+ 2?	„	1,507	+ 48	..	..
Burnley	Mar. 2	2,626	+ 181	..	..	..	11·78	..
Burton-on-Trent	„ 3	5 5	1	48	13,7·6	+ 720	6·6	..
Bury	„ 3	2,·67	+ 115	48?	61,112	+ 4,684	22·5	..
Cardiff	„ 2	4,664	+ 300	48	11,704	+ 8,555	17·35	..
Chatham and Dist.	Feb. 29	1,574	+ 25	9	6,513	— 50	14·98	..
Cork	„ 29	864	— 29	9	3,4·6	— 7	9·89	..
Croydon	„ 23	3,200	+ 228	47	83,554	+ 5,432	11·6	·75
Darlington	Mar. 2	430	+ 28	49	10,805	+ 1,002	4·87	..
Darwen	„ 1	494	+ 20	48	12,745	+ 819	4·36	..
Dover	Feb. 24	382	+ 50	47	11,7·8	+ 1 549	4·7·	..
Dublin	Mar. 1	10,387	+ 207	9	45,577	+ 2,5·8	54·25	..
East Ham	„ 4	2,22·	+ 2·8	48	13,180	+ 3,48·	7·67	..
Exeter	„ 1	456	+ 86	48	1·,13·	+ 1,026	5·5	..
Glasgow	„ 2	86 297	+ 150	..	742,4·6	+41,445	98	·25
Hastings	Feb. 29	1,419	+ 42	..	..	226	19·3	..
Huddersfield	Mar. 2	3,·?8	+ 97	48	91,909	+ 7,·07	2·?5	1
Hull	„ 2	6 014	+ 467	48	141.875	+ 8 096	44·5	..
Ilkeston	Feb. 19	151	+ 1	48	6,180	+ 146	3·8	..
Ipswich	„ 2?	710	+ 61	47	20,670	+ 1,·91	10·5	..
Kilmarnock	„ 24	256	+ 14	4?	6.694	+ 465	4·25	..
Lancashire United	„ 28	2,·22	+ 111	9	1,2·1	+ 68	39	..
Leeds	Mar. 2	14 857	+ 97·	48	362,161	+23,9·7	57·5	..
Leicester	„ 2	5,2·9	+ 495	..	..	..	20	..
Leith	„ 2	1,182	+ 85	41½	26,954	+ 2,0·9	8·72	..
Liverpool	Feb. 24	22,749	+1,189	7?	90,194	+ 5,592	116	..
‡L.C.C.	„ 21	85,0·8	+4,642	..	2,052, 81	+10·,5·5	189·5	7·27
London United	Mar. 2	10,962	+ 83	9	47,071	+ 79·	..	..
Lowestoft	„ 2	265	— 4	22	3,5·3	+ 18	3·5	..
Manchester	„ 2	32.632	+ 2,160	48	780,542	- 41,410	105	..
Newcastle	„ 2	8 298	+ 184	..	206.431	+ 15,29·	31·3	..
†Newport	Feb. 24	679	+ 39	47	3· 20·	+ 1,128	7·25	..
Oldham	Mar. 3	3,9·8	+ 219	49	94,494	+ 4,1·0	28	..
Pontypridd	„ 2	774	— 28	48	19,9·7	+ 17	5 5	..
†Portsmouth	„ 2	1,7 8	+ 89	48	103,·30	+ 7,204	16·25	..
Preston	Feb. 28	1,415	+ 4	48	37.818	+ 2,4·6	10	..
Rotherham	„ 29	1,8 1	+ 54	47?	33,1·2	+ 2,547	12	..
†Salford	Mar. 4	4 7·8	+ 119	48?	23·,188	+ 9.59·	41	..
†Sheffield	Feb. 27	6 6·0	+ 46·	48	3·2,188	+19.858	40	..
Southampton	„ 18	2 231	+ 264	48	18 924	+ 6.7·7	11	..
Southend-on-Sea	„ 28	9·6	+ 2 2	48	32 ·36	+ 4.95·	7	..
South Shields	Mar. 2	1,122	+ 44	48	29.924	+ 3 1 8	10·25	..
†Swindon	Feb. 7	1·0	+ 12	45?	7.261	+ 815	3·7	..
Tyneside	„ 28	8·6	+ 40	9	8,489	+ 19·	11	..
Wallasey	Mar. 2	1 924	+ 2·	42½	52.504	+ 6.342	8·72	..
Walthamstow	„ 2	1,845	+ 88	48	95 5·6	+ 2.415	9	..
West Ham	Feb. 22	5 208	+ 494	47	127 ·66	+11,·11	15·25	..
Wolverhampton	„ 23	1,910	+ 23	48	47,184	+ 2,156	13·75	..
Cen. London Rly.	Mar. 2	10,·06	— 540	9	45,905	— 2,709	6·82	..
City & S. Lon. Rly.	„ 3	6.634	— 214	9	30,6·5	— 763	7·26	..
Dublin-Lucan Rly.	„ 1	115	+ 8	9	525	+ 1	7	..
G.N. and City Rly.	„ 2	3,494	+ 249	9	15.442	+ 1,·42	3·5	..
L'pool Overh'd Rly.	„ 3	2,980	+ 195	9	13,822	+ 9·4	6·6	..
Llandudno-Col. Bay	„ 1	283	+ 18	1?5	1,764	+ 16·	6·5	..
Lond. Elec. Ry. Co.	„ 2	29,805	- 1,44·	9	13·,600	+ 6,·60	21·25	..
Mersey Railway	„ 2	4 ·08	+ 106	9	18.717	+ 4·2	4·5	..
Metropolitan Rly.	„ 3	88,·08	+ 3 9	9	154,633	+ 1,617	25·75	..
Met. District Rly.	„ 2	26.8 0	- 1,813	9	114,462	- 6,·02	25	..
†Anglo-Argentine	Feb. 25	47·09	- 1,7·6	..	40,·425	+1 475	..	..
‡Auckland	„ 9	17 810	+ 2·4	..	137.·09	+11,0 8	23·8	..
Bombay (B.E.T.)	„ 19	6,266	- 671	8	8,012	- 669	..	..
‡Brisbane	Jan.	17,184	+2,196	..	..	..	..	..
Brit. Columbia Rly.								
Calcutta	Mar. 2	7,942	+ 389	..	..	+ 5,029	..	..
Cape Electric T.Ld.			..	..	..	..	..	..
‡Kalgoorlie, W.A.	Jan.	2,884	..	..	..	..	20·5	..
‡Lisbon			..	..	..	..	..	..
Madras	Feb. 29	1 429	+ 269	8	6 154	+ 829	..	..
‡Montevideo	Feb.	86 ·21	+5 22·	4	125,858	+18.867	..	..
Perth (W.A.)	Mar. 1	3.791	+ 40·	9	26,967	2,559	29	..

* Compared with the corresponding period of 1911. † One week only.
‡ Includes horse, steam and other receipts. § One month.

STOCKS AND SHARES.

Tuesday Evening.

NOTWITHSTANDING the gloomy aspect presented on Monday by the news from the various districts connected with the coal strike, markets in the Stock Exchange stood up with a surprising amount of strength against the gathering factors of depression. For this the reason was to be found in the general expectation that the Government would intervene with a definite scheme to bridge the gap now cleft between masters and men. On Tuesday the air was full of rumours pointing to early settlement, and prices recovered in all departments.

The Home Railway market naturally felt a good deal of the force of the dulness and subsequent reaction upwards. The features of the week are furnished by remarkable rises in Metropolitan Consolidated and Central London Ordinary stocks, the rise being no less than 8½ in one case and 9 in the other respectively. City and South London has jumped 3½ to 38, Central London Deferred gained 4, and the Preferred 1. At the same time, London General Omnibus stock has been rising; Underground Electric income bonds have improved, taking the shares with them; London United Tramways Debenture stock gained ½; and Districts rose 1¾—the theory being that very substantial buying is in progress for the purpose of obtaining further control over the transport system of the metropolis. These very considerable advances stood out all the more conspicuously from the weakness apparent in other parts of the Home Railway market, and even the levels reached after the rises just mentioned were not the highest touched, some slight decline occurring from the top prices. The Central London rise is linked also with a statement that the line is to be extended into the South-Western districts of London; while, with regard to City and South London, we think we have already mentioned the rumour that a further extension southwards is in contemplation.

British Electric Tractions are steady, without much change after their recent rises—in fact, the two Preferred stocks have gone back a little, though the Second Debenture gained a point. Metropolitan Electric Tramway issues are unaffected by the control excitement already referred to.

Of the electrical companies abroad, Mexican descriptions are still rather inclined to weakness on account of the revolution news which continues to show a very unsettled state in that country. United States intervention was threatened at one time last week, and this the market regarded with a good deal of apprehension, as liable to cause fresh violence on the part of the Mexicans, though ultimately no doubt it would be for the benefit of the country. However, on balance, Mexican Light and Power Common is 1 lower, while the Tramways shares are ½ up at 118½, the company's 5 per cent. First Bonds being unaltered at 99, allowing for deduction of the coupon. Rio Trams are again in some favour, putting on 2 points, and Sao Paulos have risen to 199. British Columbia Electric Deferred and Preferred are a trifle duller, but the pre-ordinary stocks have recovered from the effect of the recent issue of Vancouver Debenture, and show a tendency to harden. Rangoon Electric Preference shares are weaker, falling ¼. There have been many inquiries lately in the market for quotations of the Delhi Electric Trams and Light shares, the inquiry being prompted by the transference of the capital from Calcutta to this city. There is, however, no price for the shares, and, so far as we have been able to ascertain no market has been made in them. United Electric Trams of Monte Video are better, and Winnipeg Electric Debenture put on a point.

Turning to the English Electricity Supply stocks and shares, Charing Cross Preference are not quite so good, but County of London Ordinary continues to ascend, the report and statement being considered highly satisfactory. Notting Hill Preference have risen to 10½, and the rest of the alterations in this market—what few there are—have for their cause in most cases the deductions of the dividends last Thursday.

Excitement in the Telegraph market has calmed down very considerably, and Marconis have given way, although, after all, to a comparatively slight extent. In their case, as in that of so many others, the fall is ascribed to what may happen in the event of the coal strike being protracted. West India and Panama shares are slightly harder, while the Anglo group keeps steady and the Eastern stocks show small rises in the Debenture issues. Reuters shed ¼ of their recent big advance, American Telephone and Telegraph Capital stock put on 4 points, and Mackay Companies shares have risen on the better feeling perceptible amongst American securities. The Globe Telegraph and Trust Company has declared its usual quarterly dividends this week, and there is no change in the prices of either class. National Telephone Deferred went down ½, but in other Telephone descriptions there is little going on.

In the Manufacturing section, Babcock & Wilcox again show ¼ loss. Callender's Cable are ¼ lower, and Castner's are ⅛ down. The price of India-Rubber shares has been narrowed to the disadvantage of the holder, the quotation accordingly showing a nominal fall of ½ on the week. Rubber shares had a smart spurt on the rumours about the coal strike being settled, the market also being supported by the excellent prices obtained by the leading companies for advance sales.

Metropolitan Electric Supply Co., Ltd. — The directors recommend the payment of a dividend for the half-year ended December 31st last at the rate of 4 per cent., making 4 per cent. for the year 1911. This compares with 5 per cent. per annum for 1910.

SHARE LIST OF ELECTRICAL COMPANIES.

ENGLISH ELECTRICITY SUPPLY AND POWER COMPANIES.

NAME.	Stock or Share.	Dividends for 1910.	Dividends for 1911.	Closing Quotations March 5th.	Rise + or Fall —	Present Yield p.c. £ s. d.
Bournemouth & Poole, Ord.	10	5⅛	5⅛	8¾ — 9¼	..	5 18 11
Do. 4½ % Pref.	10	4½	4½	8¾ — 9¼	..	4 14 9
Do. Second 6 % Pref.	10	6	6	10½ — 11	..	5 9 1
Do. 4½ % Deb. Stock	Stock	4½	4½	101 —102	..	4 8 3
Brompton & Kensington, Ord.	5	10	9†	8¼ — 9	..	5 11 1
Do. 7 % Cum. Pref.	5	7	7	7¾ — 8¼	..	4 4 10
Central Electric Supply, 4 % Guar. Deb.	100	4	4	98 —101	..	3 19 3
Charing Cross, West End & City Do. 4½ % Cum. Pref.	5	5	5	4 — 4⅛	..	5 11 1
Do. "City Undertaking" 4½ % Cum. Pref.	5	4½	4½	4⅛ — 4⅜	— ⅛	5 0 0
Do. Do. 4 % Deb.	5	4½	4½	8⅜ — 4⅝	..	5 9 1
Chelsea, Ord.	100	4	4	93 — 96	..	4 3 4
Do. 4½ % Deb.	5	5	5	4¼ — 4⅝	..	5 5 3
City of London, Ord.	Stock	4½	4½	98 —101	..	4 9 1
Do. 6 % Cum. Pref.	10	7	8	13⅜ — 14½	..	4 19 1
Do. 5 % Deb.	10	6	6	12 — 13	..	4 14 4
Do. 4½ % Second Deb.	Stock	5	5	117 —121	..	4 2 8
County of Durham, 5 % First Mort. Deb.	100	4½	4½	100 —103	..	4 7 5
County of London, Ord.	Stock	5	5	87 — 89	..	5 12 4
Do. 6 % Pref.	10	5	6	9⅝ — 10⅜	+ ⅛	5 18 5
Do. 4½ % Deb.	Stock	4½	4½	107 —109	..	4 2 7
Do. 4½ % Second Deb.	Stock	4½	4½	101 —104	..	4 6 7
Edmundson's, Ord.	5	Nil	Nil	⅜ — ⅝	..	Nil
Do. 6 % Cum. Pref.	5	Nil	Nil	2⅜ — 3⅝	..	Nil
Do. 4½ % First Mort. Deb.	100	4½	4½	87 — 90	..	5 0 0
Folkestone	5	6	6†	4⅜ — 5	..	6 0 0
Do. 5 % Cum. Pref.	5	5	5	4⅜ — 5⅛	..	4 17 7
Do. 4½ % First Deb.	100	4½	4½	93 — 96	..	4 13 9
Hove	5	9	9	6⅝ — 7⅛	..	6 4 2
Kensington & Knightsbridge, Ord	5	9	9	6⅞ — 7⅛	..	6 4 2
Do. 4 % Deb.	Stock	4	4	92 — 95	..	4 4 3
Kent Elec. Power, 4½ % Deb.	Stock	4½	4½	89 — 84	..	5 7 2
London Electric, Ord.	3	2	2½	1⅞ — 1⅝ xd	..	3 18 2
Do. 6 % Pref.	5	6	6	4⅜ — 4⅝ xd	..	6 5 1
Do. 4 % First Mort. Deb.	Stock	4	4	89 — 93	+ ½	4 7 0
Metropolitan	5	5	4½	3⅝ — 4⅜	..	6 1 3
Do. 4½ % Cum. Pref.	5	4½	4½	4¼ — 4⅝	..	4 17 4
Do. 4½ % First Mort. Deb.	Stock	4½	4½	99 —104	..	4 6 7
Do. 3½ % Mort. Deb.	Stock	3½	3½	84 — 87	..	4 0 6
Midland Electric Corporation 4½ % First Mort. Deb.	100	4½	4½	96 — 98	..	4 11 10
Newcastle-on-Tyne	5	4	4†	3½ — 4	..	5 0 0
Do. 5 % Pref., Non-Cum.	5	5	5	4 — 4½	..	5 11 1
North Metropolitan Power Supply, 5 % Mortgages (Red.)	100	5	5	99 —102	..	4 18 0
Notting Hill, 6 % Non-Cum. Pref.	10	..	..	10 — 11	+ ½	5 9 1
Oxford	5	7½	6†	6½ — 6⅝	..	5 9 5
St. James' and Pall Mall, Ord.	5	10	10	8 — 8½	..	5 17 8
Do. 7 % Pref.	5	7	7	6⅞ — 7⅛	..	4 16 7
Do. 3½ % Deb.	100	3½	3½	85 — 87	..	4 0 6
Smithfield Markets, Ord.	5	Nil	2	1⅜ — 1⅝	..	..
South London, Ord.	4	5	5	2¾ — 3¼	..	6 3 1
Do. 5 % First Mort. Deb.	100	5	5	99 —102	+ 1	4 18 0
South Metropolitan, 7 % Pref.	1	7	7	1 — 1⅛ xd	..	6 4 5
Do. 4½ % First Deb. Stock	100	4½	4½	97 —100	..	4 10 0
Urban, Ord.	5	5	..	⅛ — ¼	..	..
Do. 5 % Cum. Pref.	5	5	..	2⅜ — 3⅜	..	..
Do. 4½ % First Mort. Deb.	100	4½	4½	87 — 89	..	5 1 2
Westminster, Ord.	5	10	10	8¼ — 8⅝ xd	..	5 16 0
Do. 4½ % Cum. Pref.	5	4½	4½	4 13/16 — 5 1/16	..	4 6 9

COLONIAL AND FOREIGN ELECTRICITY SUPPLY AND POWER.

Adelaide, 6 % Pref.	5	6	6	5⅜ — 5⅞ xd	..	5 2 2
Calcutta, Ord.	5	8½	7†	6½ — 7	..	6 1 5
Do. 5 % Pref.	5	5	5	4 13/16 — 5 1/16 xd	— 1/16	4 16 10
Calgary Power, 1st Mort. Bds.	100	5	5	92½ — 94½	..	5 5 8
Canadian Gen. El. Com.	$100	7	7†	114 —118	..	5 18 8
Do. 7 % Pref.	$100	7	7	116 —120	—1	5 16 8
Cordoba Lt., Power and T., Ord.	1	3	3†	⅞ — 1	..	3 0 0
Do. 5 % Deb.	100	5	..	95 — 98	..	5 2 0
Elec. Lt. and P. of Cochabamba, 6 % Bonds	100	6	6	92 — 94	+1	6 7 8
Elec. Supply Victoria, 5 % 1st Mort. Deb.	100	5	5	83 — 86	..	5 16 3
Elec. Dev. Ontario, 5 % 1st Mort. Bonds	$500	5	5	92½ — 94½ xd	..	5 5 10
Kalgoorlie Elec. P. and L., Ord.	10/-	Nil	..	⅜ — ½	..	Nil
Do. 6 % Pref.	1	6	6	⅞ — 1	..	8 0 0
Kaministiquia Power, 5 % G. Bs.	$500	5	5	108 —110	..	4 11 0
Madras, Ord.	5	..	..	2⅜ — 3⅛	..	..
Melbourne, 5 % 1st Mort. Deb.	100	5	5	101½ — 103½	..	4 16 7
Mexican El. Lt., 5 % 1st M. Bds.	..	5	5	84 — 86	..	5 16 3
Mexican Lt. & Power, Common	$100	4	4†	82 — 84	—1	4 15 3
Do. 7 % Cum. Pref.	$100	7	7	105 —107	..	6 10 10
Do. 5 % 1st Mort. Gold Bds.	..	5	5	94 — 96	..	5 4 2
Monterey Rly. Light & Power, 5 % 1st Mort. Deb.	100	5	5	88½ — 90½	— ½	5 10 6
Montreal, Lt., H. and Power	$100	7	8	192 —197	..	3 11 1
Northern, Lt., Power and Coal, 5 % 1st Mort. Bonds	$500	5	..	39 — 41	..	12 3 10
River Plate, Ord.	Stock	10	..	250 —260	..	3 16 11
Do. 6 % Non-Cum. Pref.	Do.	6	6	110 —115	..	5 4 4
Do. 5 % Deb. Stock	Do.	5	5	100½ — 102½	..	4 17 7
Roy. Elec. Co., Montreal, 4½ % 1st Mort. Deb.	100	4½	4½	100 —102	..	4 8 3
Shawinigan Water, Capital	$100	4	6†	128½ — 130½	— ½	3 16 8
Do. 5 % Con. 1st Mort. Bonds	$500	5	5	107 —109	..	4 11 9
Do. 4½ % Per. Deb.	Stock	4½	4½	103½ — 105½	..	4 5 4
Toronto Power, 4½ % Deb.	Do.	4½	4½	99½ — 101½	..	4 8 8
Vera Cruz Lt., P. and T., 5 % 1st Mort. Deb.	100	5	5	92½ — 94½	..	5 5 10
Victoria Falls Power, Pref.	1	Nil	(17/6)	½ — ⅝	..	..
West Kootenay Power and Lt., 1st Mort. 6 % Gold	100	6	6	104½ — 106½ xd	..	5 12 8

TELEGRAPH AND TELEPHONE COMPANIES.

Amazon Telegraph	10	Nil	4†	7½ — 7¾	..	..
Do. 5 % Deb. Red.	Stock	5	5	97½ — 99½	+ ½	5 0 6
American Telep. & Teleg., Cap.	$100	8	8†	148 —150	+ 4	5 6 8
Do. Collat. Trust	$1000	4	4	94 — 96	— ½	4 3 4
Anglo-American Telegraph	Stock	3½	3	66 — 68	..	4 8 6
Do. 6 % Pref.	Do.	6	6	110 —111	+ ½	5 8 1
Do. Def.	Do.	80/-	80/-	25½ — 26	..	5 15 5
Anglo-Portuguese Tel., 5 % Mort. Deb.	100	5	5	100 —102 xd	..	4 18 0
Chili Telephone	5	7	..	7½ — 7⅞	..	4 13 4
Commercial Cable, Stlg. 4% Deb.	Stock	4	4	86 — 88	..	4 10 11
Cuba Telegraph	10	6	6†	10½ — 11½	..	5 6 8
Do. 10 % Pref.	10	10	10	17 — 18	..	5 11 1
Direct Spanish Telegraph, Ord.	5	4	4†	3½ — 3⅝	..	5 6 8
Do. 10 % Cum. Pref.	5	10	10	8 — 8½	..	5 17 8
Do. 4½ % Debs.	50	4½	4½	99 —101	..	4 9 1
Direct United States Cable	10	4½	..	7⅛ — 8	..	5 12 6
Direct W. India Cable, 4½ % Reg. Deb.	100	4½	4½	99 —101	..	4 9 1
Eastern Telegraph, Ord. Stock	Stock	7	5†	136 —139	..	5 0 9
Do. 3½ % Pref. Stock	Do.	3½	3½	83 — 85	..	4 2 4
Do. 4 % Mort. Deb.	Do.	4	4	100½ — 102½	+ ½	3 18 1
Eastern Extension	10	7	5†	13⅜ — 13⅝	..	5 0 11
Do. 4 % Deb.	Stock	4	4	92½ — 101½	+ ½	3 18 10
East and S. Africa Tel. 4 % Mt. Db. Mauritius Sub.	25	4	4	99 —101	..	3 19 3
Globe Telegraph and Trust	10	5⅞	6†	11 — 11½	..	5 2 2
Do. 6 % Pref.	10	6	6	13½ — 13⅝	..	4 8 1
Great Northern Telegraph	10	18	5†	34 — 35	..	5 9 1
Indo-European Telegraph	25	13	5†	56½ — 58½	..	5 10 2
Mackay Companies Common	$100	5	5†	83 — 86	+ 2½	5 16 8
Do. 4 % Cum. Pref.	$100	4	4	71 — 74	+1	5 8 1
Marconi's Wireless Telegraph	1	5	..	4⅜ — 4½	— ⅛	..
Do. 7 % Cum. Partic. Pref.	1	18	..	3½ — 3⅝	— 1/16	..
Monte Video Telephone, Ord.	1	6	6	1 — 1⅛	..	5 6 3
Do. 5 % Pref.	1	5	5	3/32 — 3/16	..	5 10 6
National Telephone, Pref.	Stock	6	6†	9⅝ — 10 2/8	..	5 17 1
Do. Def.	Do.	6	6†	12 3/8 — 12 5/8	— ⅛	4 15 7
Do. 6 % Cum. 1st Pref.	10	6	6	9½ — 10	..	6 0 0
Do. 6 % Cum. 2nd Pref.	10	6	6	..	..	6 0 0
Do. 5 % Non-cum. 3rd Pref.	5	5	5	5 7/16 — 5 9/16	..	4 12 0
New York Telep., 4½ % Gen. Bnds.	100	4½	4½	103 —104	..	4 6 6
Oriental Telep. and Elec.	1	8	..	1⅝ — 1⅞	..	4 11 5
Do. 6 % Cum. Pref.	1	6	6	1⅜ — 1½	..	4 16 10
Do. 4 % Red. Deb.	Stock	4	4	87⅜ — 89⅜	..	4 9 5
Pacific and European Tel., 4 % Guar. Debs.	Do.	4	4	98½ — 100½	..	3 19 7
Reuter's	8	5	5†	10½ — 11½	— ½	3 10 11
Submarine Cables Trust	Cert.	6	6	130 —133	..	4 10 9
Telephone Co. of Egypt, 4½ % Deb. Red.	Stock	4½	4½	99 —101	..	4 9 1
United River Plate Telephone	5	8	8	7⅞ — 7⅞	..	5 4 11
Do. 5 % Cum. Pref.	5	5	5	5⅜ — 5⅝	..	4 8 11
West Coast of America	2½	2½	2½	1⅜ — 1⅝	..	3 11 5
Do. 4 % Debs., £ to £1,500 guar. by Braz. Sub. Tel.	100	4	4	97 — 99	—1	4 0 10
West India and Panama Teleg.	10	1½	1½†	4⅞ — 4⅝	+ ⅛	..
Do. 6 % Cum. 1st Pref.	10	6	6	10⅛ — 11⅛	..	5 5 6
Do. 6 % Cum. 2nd Pref.	10	6	6	9⅞ — 10⅜	..	5 6 8
Do. 5 % Debs.	100	5	5	102 —104	..	4 16 2
Western Telegraph, Ltd.	10	7	6†	13½ — 14	..	5 0 0
Do. 4 % Deb.	Stock	4	4	99 —101	..	3 19 3
Western Union Tel., 4% Bnds. A	$1000	4	4	106 —109	..	3 13 5
Do. 4½ % Fdg. Bonds	$1000	4½	4½	102 —105	+ ½	4 5 9

* Unless otherwise stated, all shares are fully paid. † Interim dividend.

Continued on next page

SHARE LIST OF ELECTRICAL COMPANIES.—(*Continued.*)

ELECTRIC RAILWAYS AND TRAMWAYS.—HOME.

NAME.	Stock or Share.	Dividends for 1910.	Dividends for 1911.	Closing Quotations March 5th.	Rise + or Fall —	Present Yield p.c. £ s. d.
Bath Trams, Pref. Ord.	1	Nil	Nil	⅛ — ⅝	..	Nil
Do. 5 % Pref.	1	5	5	⅞ — 1⅛	..	7 5 6
Do. 4½ % Deb.	100	4½	4½	80 — 85	..	5 5 11
Brit. Elec. Trac., 6 % Pref.	100	..	..	14 — 16	..	..
Do. Do. Deferred	100	..	..	8 — 10	..	..
Do. Do. 6 % Cum. Pr'f.	100	..	..	92 — 94	—1	..
Do. 7 % Non-Cum Pr'f.	100	..	..	40½ — 42½	—1	..
Do. 5 % Perp. Deb.	100	5	5	96 — 99	..	5 1 0
Do. 4½ % 2nd Deb.	100	4½	4½	80 — 84	+1	5 7 2
Central London Railway, Ord.	100	8	8	77 — 79	+9	3 15 11
Do. Pref.	100	4	4	84 — 86	+1	4 13 0
Do. Def.	100	2	2	62 — 64	+4	3 2 6
Do. 4 % Deb.	100	4	4	100 —102	..	3 18 5
City & South London, Ord.	100	1½	1½	37 — 39	+3½	3 16 11
Do. 5 % Pref., 1891	100	5	5	107 —109	..	4 11 9
Do. Do. 1896	100	5	5	102 —104	..	4 16 2
Do. Do. 1901	100	5	5	101 —103	..	4 17 1
Do. Do. 1903	100	5	5	101 —103	..	4 17 1
Do. 4 % Deb.	100	4	4	101 —103	..	3 17 8
Dublin United Trams, 6 % Pref.	10	6	6	10⅞ — 11⅛	..	5 2 2
Great Northern & City, Pr'f. Ord	10	Nil	..	1⅛ — 1⅜	..	Nil
Hastings Trams, 6 % Pref.	5	Nil	3†	⅝ — ¾	..	..
Do. 4½ % Deb.	100	4½	4½	73 — 78	..	5 15 5
Isle of Thanet Trams, 5 % Pref.	5	2½	2½	2⅜ — 2⅞	..	4 6 11
Do. 4 % Deb.	100	4	4	75 — 80	..	5 0 0
Lancashire United, 5 % Deb.	100	5	5	82 — 84	..	5 19 1
London Elec. Railw'ys, 4 % Deb.	100	4	4	97 — 99	..	4 0 10
London United Trams, 5 % Pref.	10	Nil	..	3⅜ — 4⅛	..	..
Do. 4 % Deb.	100	4	4	75⅜ — 78½	+ ½	5 1 11
Metropolitan Railway Consol.	100	1⅜	1⅜	57⅜ — 58¼	+8½	3 4 4
Do. Surplus Lands	100	2⅜	2½	68 — 70	..	3 18 7
Do. 3½ % Deb.	100	3½	3½	90 — 92	..	3 16 1
Do. 3½ % Pref.	100	3½	3½	85 — 87	..	4 0 6
Do. 3½ % Con. Pref.	100	3½	3½	84 — 86	..	4 1 5
Metropolitan District Ord.	100	Nil	..	35¼ — 36	+1⅛	Nil
Do. 6 % Deb.	100	6	6	144 —146	..	4 2 2
Do. 4 % Deb.	100	4	4	96 — 98	..	4 1 8
Do. 4 % Prior Lien	100	4	4	100 —102	..	3 18 5
Do. 4½ % First Pref.	100	3½	4½	89 — 91	..	4 18 11
Do. 3½ % Gtd.	100	3½	3½	76 — 78	..	4 9 9
Metropolitan Elec. Trams, Ord.	1	5½	5†	3⅞ — 4⅛	..	5 13 6
Do. Def.	1	Nil	..	3⅜ — 3⅝	..	Nil
Do. 5 % Pref.	1	5	5	3⅜ — 3⅝	..	5 10 2
Do. 4½ % Deb.	100	4½	4½	99 —101	..	4 9 1
Do. 5 % Deb.	100	5	5	100½—102½	..	4 17 7
Potteries, Ord.	1	2	..	⅜ — ½	..	..
Do. 5 % Pref.	1	5	5	⅝ — ⅞xd	..	6 19 3
Do. 4½ % Deb.	100	4½	4½	89 — 92	..	4 17 10
South Metro. Trams, 6 % Pref.	1	6	..	⅜ — ⅞	..	6 17 2
Do. 4 % Deb.	100	4	4	72 — 77	..	5 4 0
Underground Elec. Railways	10	..	..	2⅜ — 2⅞	+ ⅛	..
Do. 4½ % Bonds	100	4½	4½	99 —101	..	4 9 1
Do. 6 % Income	100	1	1½†	78 — 80	+2	..
Yorkshire (West Riding), Ord.	5	Nil	..	¼ — ⅜	..	Nil
Do. 6 % Pref.	5	Nil	..	2½ — 3½	..	Nil
Do. 4½ % Deb.	100	4½	4½	81 — 85	..	5 5 11

ELECTRICAL RAILWAYS AND TRAMWAYS.—COLONIAL AND FOREIGN.

Anglo-Arg. Trams, 1st Pref.	5	5	5½	5 — 5⅞	..	5 4 9
Do. 2nd Pref.	5	5	5½	4⅞ — 5⅛	..	5 3 6
Do. 4 % Deb.	100	4	4	9 ⅜ — 95	..	4 4 3
Do. 4½ % Deb.	100	4½	4½	101½—103½	..	4 7 0
Do. 5 % Deb.	100	5	5	103½ —105½	..	4 14 9
Auckland Trams, 5 % Deb.	100	5	5	102 —105	..	4 15 3
Bombay Elec. S. & Trams, Pref.	10	6	6	10⅞ — 11½	..	5 6 8
Do. 4½ % Deb.	100	4½	4½	98 — 100	..	4 10 0
Do. 5 % 2nd Deb.	100	5	5	98 —100	..	5 0 0
Brisbane Trams Invt., Ord.	5	8	8†	8⅛ — 9	..	4 8 11
Do. 5 % Pref.	5	5	5	4⅞ — 5⅛	..	4 15 3
Do. 4½ % Deb.	100	4½	4½	100 —103	..	4 7 5
B. Columbia Elec. Rly., Def.	100	8	8†	135 —140	—1	5 14 4
Do. Pref. Ord.	100	6	6	116 —120	—1	5 0 0
Do. 5 % Pref.	100	5	5	109 —112	+ ½	4 9 3
Do. 4½ % 1st Mort. Deb.	40	4½	4½	100 —103	..	4 7 5
Do. 4½ % Vancouver Deb.	100	4½	4½	102 —104	..	4 6 7
Do. 4½ % Con. Deb.	100	4½	4½	104 —106	+ ½	4 5 0
Calcutta Trams, Ord.	5	6	..	5⅛ — 5⅜	..	5 4 4
Do. 5 % Pref.	5	5	5	4⅞ — 5⅛	..	4 16 5
Do. 4½ % Deb.	100	4½	4½	100 —108	..	4 7 5
Cape Electric Trams	1	Nil	2½†	⅜ — ½	..	..
City Buenos Aires Trams (1904)	5	5	5	5⅜ — 5⅝xd	..	4 16 0
Do. 4 % Deb.	100	5	5	101 — 103	..	4 17 3
Colombo Elec. Tr. & Lt., 5 % Deb.	100	5	5	99 — 98	..	5 2 0
Havana Elec. Rly., 5 % Bonds	$1000	5	5	100 —103	..	4 17 1
Kalgoorlie Elec. Trams	1	Nil	..	⅛ — 5/32	..	Nil
Do. 5 % A Deb.	100	5	5	91 — 94	..	5 6 5
Do. 6 % B Deb.	100	5	6†	58 — 62	..	8 1 4
La Plata Elec. Trms, Ord.	1	..	..	3/32 — 5/32	..	..
Do. Pref.	1	6	6	¾ — 1	..	6 0 0
Lisbon Elec. Trams, Ord.	1	5½	6†	1 — 1⅛	..	4 8 0
Do. 6 % Pref.	1	6	6	1 — 1⅛	..	4 16 0
Do. 5 % Deb.	100	5	5	93½ — 97½	..	5 2 7
Madras Elec. Tr. (1904), Deb.	100	5	5	93½ — 96½	..	5 3 8
Manaos Trams & Lt., 1st Deb.	100	5	5	92 — 95	..	5 5 3
Manila Elec. R. and Ltg., Bonds	$1000	5	5	99½ —101½	+1	4 18 6
Mexico Trams Com.	$100	7	7†	117½ —119½	+ ½	5 17 2
Do. Gen. Con. 5 % Bonds	..	5	5	98 —100 xd	..	5 0 0
Do. 6 % Bonds	100	6	6	100½—102½	..	5 17 1
Para Elec. Rlys. & Lt., Ord.	5	10	10	6⅞ — 7⅛xd	..	6 18 0
Do. 6 % Pref.	5	6	6	5 — 5⅛xd	+ ⅛	5 9 1
Do. 5 % 1st Deb.	100	5	5	97½ — 99½	..	5 0 6
Perth (W.A.) Elec. Tr., Ord.	1	2½	..	1⅛ — 1⅜	..	1 18 1
Do. 5 % 1st. Deb.	100	5	5	101 —104	..	4 16 2
Rangoon El. Tr. & Sup., Pref.	5	6	6	5⅜ — 5⅝	— ⅛	5 6 8
Do. 4½ % 1st Deb.	100	4½	4½	98 —101	..	4 9 1
Rio de Janeiro Trams	$100	4½	5†	118 —119	+2	4 4 0
Do. 1st Mort. 5 % Bonds	..	5	5	102½—103½	+ ½	4 16 7
Do. 5 % Mort. Bonds	100	5	5	99 — 100	+1	5 0 0
Sao Paulo Tram, Lt. and P.	$100	10	10†	198 — 200	..	5 0 0
Do. 5 % 1st Deb.	$500	5	5	102 —104	..	4 16 2
Singapore Trams, 5 % Deb.	100	5	5	81 — 84	..	5 19 1
Southern El. Tr. B.A., 5 % Deb.	100	5	5	98 — 95	..	5 5 3
Un. Elec. Trams Monte Video	5	6	7	5½ — 5⅝	+ ⅛	6 1 9
Do. 6 % Pref.	5	6	6	5⅜ — 5⅝	..	5 11 7
Do. 5 % 1st Deb.	100	5	5	99 —102	+ ½	4 18 0
Winnipeg Elec. Rly., 4½ % Deb.	100	4½	4½	105 —107	+1	4 4 1

MANUFACTURING COMPANIES.

Aron, Ord.	1	Nil	6	⅝ — ¾	..	..
Do. 6 % Pref.	1	9	6	8⅞ — 9⅛	..	7 2 2
Babcock & Wilcox	1	26	24†	6⅜ — 6⅝	— ⅛	3 18 7
Do. Pref.	1	6	6	1⅝ — 1⅞	..	3 13 10
B.I. & Helsby Cables	5	10	8†	6⅜ — 7⅛	..	6 17 11
Do. Pref.	5	6	6	5⅞ — 6⅛	..	4 16 0
Do. Deb.	100	4½	4½	101 —103	..	4 7 5
British Thomson-Houston, Deb.	100	4½	4½	92 — 95 xd	..	4 13 9
British Westinghouse, Pref.	3	Nil	..	⅛ — ⅜	..	Nil
Do. Deb.	100	4	4	62 — 65	—1	6 3 1
Do. 6 % Prior Lien	100	6	6	102 —105	..	5 14 3
Browett, Lindley, Ord.	1	Nil	..	1/6—2/-	..	Nil
Do. Pref.	1	Nil	..	5/- —6/-	..	Nil
Brush, Ord.	2	Nil	..	0 — ¼	..	Nil
Do. 7 % Pref.	2	Nil	..	0 — ¼	..	Nil
Do. 4½ % Deb.	100	4½	4½	54 — 59 xd	..	7 10 6
Do. 4½ % Second Deb.	100	4½	4½	37 — 42	..	10 14 4
Callender's Cable	5	15	10†	8⅞ — 9⅜	— ¼	7 17 11
Do. Pref.	5	5	5	5 — 5¼	..	4 15 3
Do. Deb.	100	4½	4½	98½—100½	..	4 9 7
Castner-Kellner	1	17½	20	34 — 36	— ½	5 10 4
Do. Deb.	100	4½	4½	106 —110	..	4 1 10
Crompton & Co.	3	Nil	Nil	⅛ — ⅜	..	Nil
Do. Deb.	100	5	5	58 — 62	..	7 7 1
Dick, Kerr	1	5	..	3⅞ — 3¼	..	5 3 1
Do. Pref.	1	6	6	5⅝ — 1⅝	..	5 9 9
Do. Deb.	100	4½	4½	97 —100	—1	4 10 0
Edison & Swan, A, £3 paid	5	Nil	..	¼ — ½	..	Nil
Do. fully paid	5	Nil	..	1⅛ — 2⅜	..	Nil
Do. 4 % Deb.	100	4	4	71 — 75	..	5 6 8
Do. 5 % Second Deb.	100	5	5	77 — 80	..	6 5 0
Electric Construction	2	Nil	2½†	¾ — 1	..	..
Do. Pref.	2	7	7	1⅝ — 1⅞	..	7 9 4
Greenwood & Batley, Pref.	10	7	7	7⅞ — 8½	..	8 5 8
Do. Deb.	100	5	5	94 — 96	..	5 4 2
General Electric, Pref.	10	5	5	9 — 9½	..	5 5 3
Do. Deb.	100	4	4	87 — 92	+2	4 7 0
Henley's, Ord.	5	15	10†	11⅜ — 12½	..	6 2 5
Do. Pref.	5	4½	4½	5 — 5½xd	+ ⅛	4 5 9
Do. Deb.	100	4½	4½	104 —106	..	4 4 11
India-Rubber, G. & T.	10	10	..	10 — 11	— ⅓	..
Do. Pref.	10	5	5	9½ — 10½	..	4 17 7
Telegraph Construction	12	20	10†	85½ — 87½	..	6 7 0
Do. Deb.	100	4	4	99¼ —101¼	..	3 18 10
Willans & Robinson	1	Nil	..	1/16 — ⅛	..	Nil
Do. Pref.	5	Nil	..	1½ — 1⅝	..	Nil
Do. Deb.	100	4	4	61 — 64	..	6 5 0

* Unless otherwise stated, all shares are fully paid. † Interim dividend.

The yields are calculated in most cases upon the dividends paid for 1910.

Bank rate of Discount 3½ per cent., February 8th, 1912.

EXPORTS AND IMPORTS OF ELECTRICAL GOODS DURING JANUARY, 1912.

If the figures which we record herewith are any indication, the year 1912 opens well as regards electrical business. In all three sections (exports, imports and re-exports) the January totals are well above the averages obtaining last year.

In the export section the total of £467,471 compares with £375,208 in December, and was, in fact, exceeded on only one occasion last year.

The import total of £228,245 is more than £20,000 in advance of the previous month's figures, and the re-exports total of £35,325 for January, constitutes a record in our returns.

As regards the exports, the satisfactory total is largely due to the flourishing state of the cable and machinery export trade, the former business being valued at £102,000 for the month, while the latter exceeded £190,000 in value. Telegraphic exports at over £66,000 are also above the recent level.

In the case of the imports, the machinery, and telegraphic and telephonic sections show an improvement on the December returns, while glow lamp imports show some falling off, and other items remain stationary. During the month India was an exceptionally good customer of ours, while Japan, South America and Australia also contributed largely as purchasers. German imports into this country remained steady, but the United States nearly doubled its contribution of December last.

Registered Exports of British and Irish Electrical Goods from the United Kingdom.

Destination of exports and country consigning imports.	Electrical goods and appliances.	Wires and cables, rubber and other insulations.	Electric lighting fittings and accessories.	Electric glow lamps.	Electric arc lamps and lamp parts.	Electric meters and instruments.	Electric machinery.	Electrically-driven machinery.	Batteries and accumulators.	Carbons.	Telephonic cable, and apparatus and electric bells	Telegraphic cable and apparatus.	Total.
	£	£	£	£	£	£	£	£	£	£	£	£	£
Russia, Sweden, Norway and Denmark ...	910	528	324	48	120	47	10,476	68	763	...	95	264	13,643
Germany and German W. Africa	1,199	722	...	576	...	69	2,938	...	10	...	...	...	5,514
Netherlands and Java	404	1,064	5	...	25	9	2,354	...	23	...	27	763	4,674
Belgium	545	414	54	28	623	71	1,215	526	1	...	1,253	44	4,874
France and Fr.W. Africa	1,826	38	334	14	99	1,043	9,098	882	6	50	331	285	14,006
Portugal	164	102	30	...	10	...	306	...	4	...	267	30	913
Spain, Canary Isles and Spanish N. Africa...	273	59	158	12	11	384	1,121	...	....	...	12	48	2,078
Switzerland, Italy and Austria-Hungary ...	548	2,930	76	23	81	148	2,141	215	13	...	...	7,533	13,708
Greece, Roumania and Turkey	26	378	63	...	...	...	33	...	29	...	...	98	627
Channel Isles, Gibraltar, Malta and Cyprus...	30	78	97	59	...	40	113	...	6	...	8	1,762	2,193
U.S.A., Philippines and Cuba	31	10	114	509	54	49	392	...	4	25	...	645	1,833
Canada and Newfoundland	609	474	95	1,176	60	3,231	9,425	...	302	115	273	1,102	16,862
British West Indies, British Honduras and British Guiana	48	...	332	10	...	133	268	3	...	...	9	97	900
Mexico and Central America	20	158	87	...	...	...	585	...	1	...	1,055	305	2,161
Peru, Uruguay and Paraguay	13	735	218	12	...	43	1,219	129	23	...	53	18	2,463
Chile	408	315	369	...	...	66	5,012	7	92	...	23	884	7,176
Brazil	1,694	1,112	22	828	...	796	5,473	1,456	29	...	301	21,815	33,526
Argentina	3,140	9,118	1,129	350	590	11	10,141	741	2,665	819	322	728	29,754
Colombia and Ecuador	...	...	37	...	...	...	143	...	4	...	139	...	323
Egypt, N. Africa and Persia...	226	427	147	117	...	2	722	123	280	...	433	705	3,132
British West Africa and St. Helena ...	9	16	71	...	31	...	537	...	28	...	136	5,421	6,249
Rhodesia, O.R.C. and Transvaal	2,145	1,858	523	1,358	248	178	4,185	18	66	52	35	191	10,857
Cape of Good Hope	1,780	3,776	659	282	80	424	5,488	226	189	...	164	340	13,408
Natal	666	7,967	557	270	16	75	2,321	27	673	...	115	9	12,696
Zanzibar, Brit. E. Africa, Mauritius & Aden	87	261	250	38	12	...	70	11	150	...	112	15,049	16,040
Madeira and Portuguese Africa	235	396	77	75	16	69	215	...	4	...	127	14	1,228
China and Siam	875	1,726	177	466	19	37	1,269	...	49	...	16	...	4,634
Japan and Korea	773	551	16	40	890	2,447	32,124	9,831	8	...	1,092	266	48,038
India	4,580	14,419	3,770	2,070	302	234	27,214	1,440	3,017	189	2,716	981	59,932
Ceylon	173	537	195	...	21	476	69	1,245	323	...	305	125	3,469
Straits Settlements and Fed. Malay States...	716	246	211	83	56	852	632	78	865	...	40	278	4,057
Hong Kong	581	775	44	13	27	143	1,480	40	19	94	9	198	3,423
West Australia	510	477	76	236	45	...	792	326	136	...	278	3,408	6,284
South Australia	1,275	6,514	326	348	38	4	1,574	34	27	...	319	18	10,477
Victoria	1,037	13,774	2,133	1,046	75	71	6,219	524	5,437	19	2,938	260	33,533
New South Wales	4,722	12,777	503	1,254	17	681	12,592	1,833	150	28	1,470	1,156	37,183
Queensland	574	3,041	131	161	...	...	1,835	3,649	...	...	471	398	10,260
Tasmania	18	37	10	83	...	7	...	...	...	...	...	...	105
New Zealand and Fiji Islands	1,886	14,190	404	579	18	21	5,169	761	447	...	639	1,124	25,238
Total, £	34,756	102,000	12,774	12,114	3,584	11,861	166,960	24,193	15,793	1,391	15,683	66,362	467,471

Registered Imports into the United Kingdom of Electrical Goods from all Countries.

Russia, Norway, Sweden and Denmark ...	14	12	...	82	23	...	4,505	...	285	55	9,946	14,922
Germany	1,479	3,923	1,764	25,693	7,170	2,188	49,811	224	2,220	7,998	36,314	138,784
Holland	66	45	...	2,388	629	...	9	...	...	42	...	3,179
Belgium	512	948	129	50	19	64	2,705	...	417	770	9,243	14,857
France	171	248	715	883	484	1,089	520	...	1,363	2,883	1,539	9,895
Switzerland	19	396	433	13	...	...	811	...	...	4	20	1,696
Italy	4	264	...	...	...	37	...	...	...	...	2,296	2,601
Austria-Hungary	...	1,305	...	822	306	55	15	...	167	270	82	3,022
United States	2,230	422	344	3,503	2,194	...	8,774	15,666	243	446	3,781	37,603
Total, £	4,495	7,563	3,385	33,434	10,825	3,433	67,150	15,890	4,695	12,468	63,221	226,559

Additional imports: Canada, goods, £2; machinery, £1,594. Spain, carbons, £90.

Registered Re-Exports of Foreign and Colonial Electrical Goods from the United Kingdom.

Various countries, mainly as above ...	21,834	1,117	...	3,153	446	...	7,171	...	194	371	1,039

Total Exports: £467,471. Total Re-Exports: £35,325. Total Imports: £228,245.

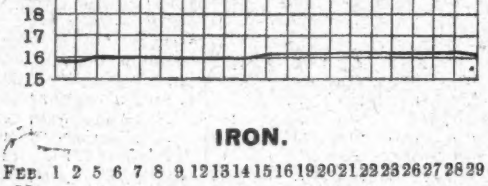
Note.—The amounts appearing under the several headings are classified according to the Customs returns. The first and third columns contain many amounts relating to "goods" otherwise unclassified, the latter, doubtless, consisting of similar materials to those appearing in adjacent columns. Imports are credited to the country whence consigned, which is not necessarily the country of origin.

METAL MARKET.

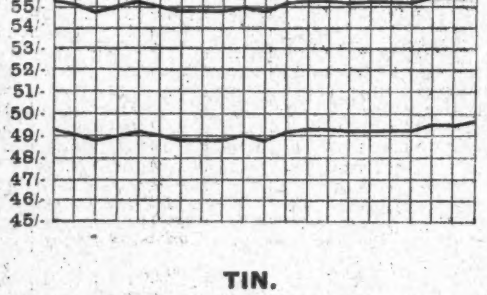
Fluctuations in February.

SPELTER (G.O.B's.).

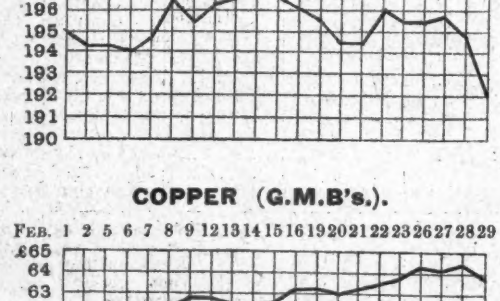
LEAD (ENGLISH).



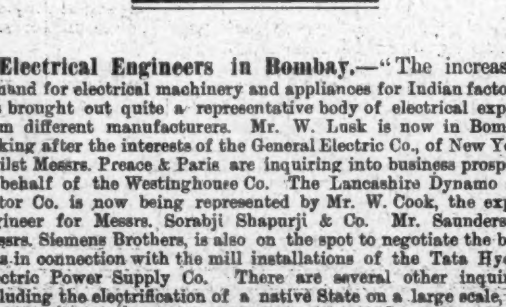
IRON.



TIN.



COPPER (G.M.B's.).



Electrical Engineers in Bombay.—"The increasing demand for electrical machinery and appliances for Indian factories has brought out quite a representative body of electrical experts from different manufacturers. Mr. W. Lusk is now in Bombay looking after the interests of the General Electric Co., of New York, whilst Messrs. Preace & Paris are inquiring into business prospects on behalf of the Westinghouse Co. The Lancashire Dynamo and Motor Co. is now being represented by Mr. W. Cook, the expert engineer for Messrs. Sorabji Shapurji & Co. Mr. Saunders, of Messrs. Siemens Brothers, is also on the spot to negotiate the business in connection with the mill installations of the Tata Hydro-Electric Power Supply Co. There are several other inquiries, including the electrification of a native State on a large scale, the promoters being well-known Bombay citizens."—*Indian Textile Journal.*

PROCEEDINGS OF INSTITUTIONS.

Automatic Reversible Battery Boosters.

Discussion on paper read by MR. R. RANKIN *before the* INSTITUTION OF ELECTRICAL ENGINEERS *at Birmingham, February 14th*, 1912. *For abstract of paper see* ELECTRICAL REVIEW, *December 8th and 15th*, 1911.)

MR. A. M. TAYLOR was not quite convinced that the way in which automatic reversible boosters were worked was necessarily the best. Unfortunately for the battery, it was not at present a strictly reversible machine, nor would it be until it was suited for the same rate of charge and discharge. The automatic booster was undoubtedly a very valuable piece of apparatus, particularly because it dealt with the battery as a whole, and so avoided any disturbing cause tending to make one cell behave differently from another. He understood that on the Continent and in America automatic means had been employed, using regulating cells exclusively for the discharges, and he thought that there was a danger of such means entering into serious competition with boosters in this country if the size and cost of the latter were not kept in check. This result could be obtained by sacrificing, to some extent, the feature of the automatic booster whereby the battery was charged in the intervals between the discharges; it would be in no way at a disadvantage compared with regulating cells, since these would also suffer from the same weakness. He was not at all convinced that the making-up of a load at the generating station in this way was of such great importance, and he believed that the disadvantage would be more than compensated for by the greater capacity of the battery to deal with severe discharges which would be obtained by the method he proposed. Briefly, this was to increase the number of cells in the battery above that required merely to float upon the line, and to employ series-parallel grouping of the boosters for the purpose of putting the final charge into the battery late at night or early in the morning. In those cases where the average load did not possess a constant value throughout the whole day, there would be a very decided gain in employing series-parallel arrangements, and they could reduce the size of the booster to very nearly half. If the booster could be arranged to be coupled in series or parallel at will, it would be quite feasible to give any charge required by the battery at any time of the day. He had worked out a switching arrangement which could be operated without any adjustment of the booster field or interruption of the current. It would be found that owing to the reduction in the amount of boost required and in the size of the booster, the current taken from the battery to drive the booster was so much less than before, that the reduction in the output of each cell throughout the whole battery was sufficient to pay the capital value of the increased number of cells, while the energy losses in the booster must obviously be less with the smaller booster, and the general efficiency was improved.

MR. F. W. FOSTER did not agree that in the case of a works generating its own electricity for lighting and for a very highly fluctuating power load, the economy shown by a battery booster attained its maximum. The load factor in most works where a battery booster plant would be proposed was better over the working hours than over the working hours of a central station, which were 24 hours to the day and included many periods of light load. The disadvantage of over-compounding a generator and booster was best corrected by altering the compounding of the generator to level compounding by means of a diverter or definite alterations of the series turns on the generators, for he was of the opinion that it was inadvisable to use over-compounded generators with over-compounded boosters, and believed that general opinion now advised level compounding of the generators, or even plain shunt winding at stations of moderate or large capacity. The sluggishness of the inductive lag of the diverter circuits in obtaining relative values could surely be overcome by using tappings on the series coils and a selector switch, if the inaccurate working mentioned by the author was worth serious consideration. As the author had claimed traction and similar loads as within the legitimate field covered by battery booster plant, he pointed out the great advantage of end-cell regulating gears as used on the Continent. These were automatic in action and resulted in much higher economy—they were lower in first cost, more robust, and less liable to damage when short-circuit conditions arose.

DR. C. C. GARRARD suggested that the sluggishness due to the fact that the diverter was non-inductive while the field coil in parallel with it was highly inductive could be got over by making the diverter inductive. With reference to the split-pole converter mentioned, the simplest way of looking at the action of this machine was to regard it as a question of distortion of E.M.F. wave form. The D.C. voltage of a converter was given by the maximum value of the E.M.F. wave, while the A.C. value was given by the R.M.S. value of the wave. By splitting the pole face, the wave form was distorted so that the relation between the maximum and R.M.S. values could be altered. The overshooting effect mentioned in connection with the Entz booster was of great importance not only in connection with that type but also with the Tirrill regulator. It was rather extraordinary at first sight that either of these regulators should act with the rapidity with which they did act. Their rapidity of action seemed to depend upon this overshooting principle, viz., the initial change in field excitation voltage was made much larger than was actually required to take charge of the alteration in the load. Directly, however, the required regulation was obtained, the action was suddenly stopped and an over-regulation was prevented.

MR. R. RANKIN, in reply, said it was very possible that the present methods of operating automatic boosters might be improved upon

Undoubtedly it was a bad thing to try to store energy in a battery at too high a rate, and some boosters absolutely refused to do it, but he would point out that there were some externally regulated boosters with which it was possible to limit the charging current to a desirable value and allow the generator current to decrease, and at the same time to get a good equalising action for normal working and avoid the extreme conditions with which Mr. Taylor had dealt. With regard to regulating switches, what must be the state of affairs with them if so many difficulties were encountered with the use of boosters? Mr. Taylor's figures and curves seemed to him to apply to installations and conditions for which an automatic booster would not be required. In all ordinary central stations an automatic booster was only useful on traction, which was only a part of the load, and very often only a minor one. An inspection of a steel works load chart would show that what he said in the paper was correct. The results given in the table* were for such a load with a maximum mean load of about 600 amperes with peaks to about 1,500 or 1,600 amperes of short duration occurring rapidly one after the other during the whole period of working. Two 800-ampere generators would be required to handle the load without the battery and booster, whereas, with them, one at about ¾-load was sufficient, having only a steady load to handle and giving a constant voltage. The average mean load over the whole period of the test connected with the table was about 300 amperes. The other works mentioned in the paper employed gas engine-driven generators, which were probable compounded, but with a load like that outlined above, the compounding was of little avail. Regulating the voltage would not give the advantage of a steady load, whereas a proper battery and booster would give both steady load and voltage. Traction and similar loads were not only within the field covered by battery booster plants; they were the ideal loads for automatic plant. On such loads instantaneous reversibility of action was the ideal aimed at in the equalising plant, and cell regulating switches would be worse than useless. Their action must be infinitely slower than the most sluggish booster. With regard to Dr. Garrard's remarks, an inductive diverter would be rather costly, and as it would be used with the most expensive kind of booster, that is one with a laminated field probably, it would place this kind of booster at a still greater disadvantage as far as price was concerned.

Electric Driving in Textile Factories.†

ON February 12th, under the auspices of the HUDDERSFIELD TECHNICAL COLLEGE TEXTILE SOCIETY, Mr. John Shaw, of Manchester, delivered a lecture on "Electric Driving in Textile Factories."

The LECTURER said that over 10 years ago the advocates of electrical driving for textile mills first began their campaign in this country. Since that date the pioneers had by their strenuous and persistent efforts overcome the early opposition and difficulties, and had demonstrated the justice of their early claims by having set to work successful installations in all parts of the kingdom and in all branches of the industry. He could confidently assert that electric driving by polyphase induction motors had firmly established itself as the best known means for transmitting unaltered the regularity of speed from the prime mover to the driven machine. It was seven years since he secured the first contract given in the United Kingdom for the complete electrical driving equipment for a new mill, viz., the Acme Spinning Co.'s mill at Pendlebury. Since that date many important contracts had been carried out by various firms, and to-day statistics showed that upwards of 50,000 B.H.P. in motors had been installed in this kingdom alone. The lecturer's personal portion of that amount was over 30,000 H.P., and he was in the probably unique position of being able to say that he had never yet installed electric driving in any single concern but that extensions to the original installations had followed. Since the Acme Spinning Co.'s mill was started in December, 1905, there had been a continuous demand for electric driving; further, it had been an increasing demand, the contracts secured varying in the writer's case from 3,155 H.P. in 1905, to 7,579 H.P. in 1910, and nearly 8,000 H.P. in 1911. The earliest installations were all carried out on the so-called group system of driving, and the motors were consequently of large individual capacity. The reason for the adoption of that course was obvious; capital cost had to be kept down. Greater sub-division of mills into smaller sections had always been advocated by electrical engineers, in order to provide closer supervision and greater control over the output, and it was interesting to note that in the seven years the average size per motor had dropped from 45 H.P. in 1905 to just over 20 H.P. in 1911.

Since the main characteristic of polyphase induction motors was to reproduce exactly the turning moment with which the main generator was driven, it followed that a shaft so driven had the same regularity of speed as the main engine. That method of procedure had necessarily involved reconsideration and special designing of millwrighting work to be used in connection with these motors, by reason of the fact that the shafts were required to run at higher speeds than obtained in the mechanically-driven mills. Speeds increased and shaft and pulley diameters decreased, bearing centres merely being the determining limit of both speed and size of shaft. The largest diameter of shaft in the Acme Spinning Co.'s mill, which contained 1,350 H.P. in motors, was 3 in., transmitting 200 H.P. at a speed of 585 R.P.M., and driving cotton mules. In another large mill containing over 1,700 H.P. in motors, 300 H.P. was being transmitted through a shaft 3½ in. diameter running at a speed of 585 R.P.M., driving cotton and doubling frames. The same thing applied also to other branches of the industry, such as woollen, worsted, jute, flax, &c., particularly as regards the spinning and twisting sections. In two different woollen mills he had installed line shafts 2½ in. diameter, running at 585 R.P.M., driving woollen mules, one transmitting 175 B.H.P., and the other 150 B.H.P. Both mills were of shed construction, and the shafts were carried from the roof gutters. The first drive was installed on the understanding that should any difficulty arise due to vibration, the motor should be taken down and the rope pulleys and ropes provided free of cost to the purchaser for driving the shaft at ordinary speed. Both drives had been running with perfect success for over two years. In all cases of high speeds, not only did the writer design the motor application, but also the shafting and millwrights' work, since his experience proved it to be equally essential in obtaining good results that the shafting should be right as well as the motors and electrical equipment. More troubles had been experienced in electrical installations due to those details than from any other cause. Work which might be good enough to run at 300 to 350 revolutions would not be satisfactory when running at 580 or 725 revolutions, although by giving due attention to all the details it was just as easy to make it satisfactory and capable of running without vibration and with a minimum amount of friction loss. Bearing on the friction loss in shafting at those high speeds, one shaft installed in 1905, transmitting 150 H.P. at 485 revolutions, 3-in. diameter to 2½ in. in 13 bearings, and with 25 ropes on loose pulleys, ran for 4 minutes 20 seconds after current was shut off from the motor.

The natural result of the adoption of such line shaft speeds was to reduce the diameters of the driving pulleys, making them more nearly the same size as the machine pulleys. The lecturer's experience proved to him that the smaller the ratio between driver and driven pulley, the better and sweeter the drive, and the smaller the slip, with consequent longer life to the driving belt or rope.

Subdivision of mills into sections or departments had, of late years, been carried out to a much greater extent than originally obtained. Whether it was commercially sound to carry it so far as to drive each machine by its own motor he was not prepared to say. In his opinion, based on the results of experience with both the group and individual driving of textile machines, each case required consideration on its own merits; while it might be right to adopt individual driving in one case, it might be equally wrong to adopt it in another.

By far the majority of electrical installations were for the conversion of old mills to the newer driving method, and naturally the question arose as to the time lost in making the alterations. Necessarily, there was some time lost in each instance, as it was almost impossible to carry through a complete reorganisation of all the driving arrangements of a large mill without interfering with its working. In four mills recently converted, one containing over 1,800 H.P. in motors, the second 1,100, the third 1,700, and the fourth 1,300, the average total stoppage of the mill due to the substitution of electrical for mechanical driving was one day in each case.

A very great proportion of the benefits derived from electrical transmission was dependent on the regularity of turning of the prime mover driving the electric generator. The steam turbine was a prime mover which provided a turning moment of practically perfect regularity. It was peculiarly well adapted to the requirements of electrical driving, although, owing to its speed of rotation, necessary to obtain good economy, not well adapted to driving by any other known means. When considering such delicate fabrics as were found in textile mills of all descriptions, the advantage of such a turning moment was self-evident. Its economy, steam consumption and first cost were at least equal, if not superior, to those of the best reciprocating sets, and present-day practice was towards the adoption of the turbine for all industrial purposes. Practice favoured the adoption of large units from 1,000 to 5,000 KW. capacity. It was a significant fact that, of the total of 50,000 H.P. of motors installed in textile works, probably more than one-half was driven from the mains of either Corporations or public supply companies. Wherever it was possible, there was no doubt that taking power from an outside source was commercially sound. Instead of sinking capital in non-producing boilers and engines, consumers might invest that capital in producing machinery, and be relieved of all anxiety and worry as regards the maintenance of their power source and the keeping of it abreast of the times. Capital locked up in producing machinery was much more remunerative than the same amount sunk in boilers and engines.

Even, however, in those cases where an outside supply was not available, the steam turbine held its own in competition with other methods of generating power. Apart from its superior turning moment, so valuable in connection with textile work, its cost to-day was no more than that of the steam engine. Its applicability and facility of providing, without loss, steam for heating for such places as required it, was unequalled.

Further, the steam turbine lent itself peculiarly well to those cases where the existing engines, already overloaded, were required, owing to exigencies of trade, to provide power for extensions.

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* ELECTRICAL REVIEW, December 18th, 1911, p. 1003.

† From the *Huddersfield Examiner*.

The Lighting of Machine Shops.—Referring to this article in our last issue, the BENJAMIN ELECTRIC, LTD., write pointing out that the American Holophane D'Olier reflector can only be used with Edison screw lamps, and is not designed for English-made lamps, whereas the Holophane-Benjamin line of steel reflectors has been designed for English use.

NOTES ON RECENT ELECTRIC RAILWAY DEVELOPMENTS.

[CONTRIBUTED.]

The tardy development of main-line electric traction in this country is in remarkable contrast with the progress already effected in Continental countries. Two causes mainly responsible for this state of affairs are: (1) The existence of large waterfalls near or on the routes of the railways, provides energy at a cost below the minimum attainable in coal-fired generating stations; (2) many of the railways concerned are entirely new lines, so that it is a question only of *difference* in capital costs between steam and electrical systems; there is, in such a case, no capital to be sunk in *conversion*.

Each fresh route opened establishes more firmly the economic possibilities of electrical operation, and the following notes deal with a few of the more important results of the experience now gained and present interesting leading data regarding the rolling stock in special cases.

General Advantages and Effects of Electrification.—It appears from the results realised in a number of schemes of various descriptions, that an electric railway, if not actually cheaper in first cost than the equivalent steam line, offers, in any case, such operating economies as fully justify any additional capital outlay which may be incurred. In a number of cases electric locomotives have run 50,000 miles between overhauls, with only running adjustments of the brakes, whereas a steam loco requires coaling every 150 miles or so and needs washing out and overhauling at frequent intervals. The advantage it possesses in this respect alone compensates for the usually higher energy bill of the electric locomotive.

On short-distance and suburban lines, the advantages of electric traction are incontrovertible, and though it is not so easy to make out a case on paper for the electrification of long-distance lines, Continental experience is annually affording additional proof of the overall economy secured. Electrical railways are subject to energy losses in transmission lines which are, however, compensated for by the high efficiency of the large stationary generating units at the central station. Coal sheds, water tanks and similar equipment are unnecessary on an electric railway. Lighter trains may be profitably employed, and a more frequent service may be adopted. Branch lines may be increased in number, and from the termini of such may be erected trolley-bus routes, further to increase the area of traffic collection. The handling of trains is considerably simplified by electrification and, in goods service, in particular, the rapid working of heavy trains is much facilitated by electric traction.

Continental lines are investigating the problem whether a railway should erect its own generating station or purchase energy from one or more independent stations along the route. In the case of long-distance routes, it would certainly appear advisable to adopt the latter course if possible. In this country, in the absence of appreciable water power, we may hope for the erection of large co-operative central stations in the coal fields.

In a number of Continental areas, industrial development and the progress of railway electrification have proved to be interdependent. Industrial development, already realised or imminent, justifies the erection of electric railways, which then lead to the rapid further development of the districts served. The strategic possibilities (in weakness or strength) of electric railways, though of relatively small importance in this country, are a crucial consideration in Continental States, and it is satisfactory to note that the Prussian War Department has admitted that electric railways are no more liable than steam railways to interruption by hostile forces in case of war.

Question of Supply System: Examples of Rolling Stock.—For short-distance lines, the direct-current system of operation is economically feasible, and, on account of its well-known convenience, is usually adopted. Where, however, large amounts of energy have to be transmitted over long distances, high-tension A.C. distribution becomes imperative, and the choice of system is practically confined to single or three-phase current. Single-phase working requires only a single overhead line, and a single bow at each collector point, as against three lines and triple bows in a three-phase system. Three-phase locomotives have the advantage (where it may be regarded as such) of full draw-bar pull at all speeds. Three-phase motors are essentially constant-speed machines, and hence allow of very high schedule speeds, the huge power required to maintain speed at times being readily provided by the reserve capacity of the generating plant. On the other hand, such high speed is not always desirable on heavy routes, and with steady improvements in the single-phase traction motor (resembling in its general characteristics the series D.C. motor), this type is being generally preferred on the Continent. Single-phase current at 15,000 volts and 15 cycles per second is practically standard on Swiss railways; in Germany, Austria, Hungary, and Norway, 10,000 volts 15 cycles single-phase supply is common; and the French Chemin de fer du Midi is adopting 12,000 volts 15 cycles single-phase current for its electrified section.

On the Dessau-Bitterfeld lines, various experimental electric locomotives have been tested; those by the A.E.G. have variously been equipped with motors of 1,000, 950, and 800 H.P., and the Siemens locos are of 1,800, 1,250, 1,100, and 800 H.P. The standard now adopted is 1,800 H.P. per loco with single-phase motors running at 307 R.P.M., giving a maximum train speed of 74 miles per hour. The Maschinenfabrik Oerlikon are reported to have completed an exceptionally powerful single-phase locomotive, yielding 2,000 effective H.P. on 15,000 volts 13-17 cycles supply.

A powerful type of three-phase locomotive, which has been adopted by the Italian Giovi line for goods service, has five wheels coupled, and is driven by two 3,000-volt, 15-cycle, three-phase motors at 45 or 22½ km. per hour, according as the motors are in parallel or cascade. Maximum gradients of 3½ per cent. and curves of 400 m. radius are encountered on this line, and when handling 540-ton goods trains, one locomotive hauls and one pushes, while for 680-ton trains, one hauls and two push.

The Piedmont and North Railway (U.S.A.), an inter-urban line, 125 miles in length, employs 55-ton D.C. locos, driven by four 1,500-volt interpole motors geared to the axles, for hauling 800-ton freight trains. A very heavy type of motor coach used on the Dermuls-Mendelpan line (Tyrol) weighs 28 tons empty, carries 40 passengers, and is driven at a maximum speed of 16 M.P.H. by four 70-H.P. direct-current motors. The gradients traversed are very severe, hence each coach is equipped with vacuum, magnetic, short-circuit and hand brakes. The latter alone yield 23,800 kg. pressure at the wheel rim with a force of 50 kg. applied at the hand wheel.

For goods sidings and yards, battery locomotives present the advantages of high weight per axle (and hence high draw-bar pull without slipping), and avoidance of elaborate overhead equipment for current supply (which equipment, besides being very costly to install in such a case, is, in parts, little used).

The use of petrol-electric motor vehicles enables the advantages of electric traction to be realised on short-distance and branch lines where the capital cost of a regular overhead or track supply equipment would be prohibitive. The Buffalo, Roch. and Pittsburg Railway employs a type of petrol-electric vehicle seating 69 passengers (97 maximum—a wide range, but thus quoted); a 100-gallon gasoline tank needs refilling after 200 miles' run. The general electrical and mechanical driving provisions are, broadly, similar to those on the G.W.R. units (which seat 45 passengers and attain a normal maximum speed of 20 M.P.H.).

The lightness of electric locomotives necessitates a careful concentration of weight on the driving wheels. This naturally requires the placing of the motors over the latter, but it is important that the arrangement adopted does not involve the whole motor vibrating with the axles. Chiefly for this reason, gear coupling of motors to the axles and the use of "built-on" armatures and "frame-mounted" fields have given way to the apparently unnecessary and artificial method of driving through connecting rods. The motor is mounted on the main framing, and power is transmitted from its shaft to the driving wheels through a preliminary gear reduction and countershaft, if necessary, by connecting rods. It is not advisable to get the centre of gravity of the com-

pleted locomotive too low, or the rail wear at curves will be very severe.

The collector bow has, of course, quite replaced the trolley wheel for high power high-speed working, but there is room for improvement in many existing designs by lightening the moving parts. The capital cost of overhead equipment may be greatly reduced by employing lighter supporting structures than are at present common. On the Simplon and Giovi lines, quite light piping supports have proved perfectly satisfactory.

The whole matter of railway electrification constitutes a vast problem, to which no adequate treatment can be given in any single contribution, and it has here been the writer's aim to collect a few of the chief results derived from recent Continental experience. In conclusion, it may be noted that factors, in addition to those remarked above, which have undoubtedly fostered Continental progress in electric railway schemes are :—(1) The vast capital so readily placed at the disposal of electrical concerns by Continental banks and financiers in general ; (2) the great practical interest displayed by various Governments, notably those of Switzerland and Germany, in the possibilities and realisation of electrification proposals.

AN ELECTRICALLY-OPERATED BRIQUETTING PLANT.

As the world's supply of metalliferous ores is getting more restricted, mining engineers and metallurgists are turning their attention more and more closely to the problems involved in the utilisation of the cheaper grades of ore which, in former times, were regarded as unsuitable for profitable working, and some very interesting processes have been introduced within recent years for the purpose of rendering these ores into a form suitable for use in the blast furnace. One of the chief difficulties which has hitherto been experienced in the utilisation of some ores is their state of fine mechanical division, and in order to overcome this difficulty numerous schemes have been suggested depending, in some form or other, upon the compression of these fine ores into briquettes or blocks of sufficient hardness to withstand, even in a heated condition, the mechanical pressure to be found in the blast furnace, and at the same time of

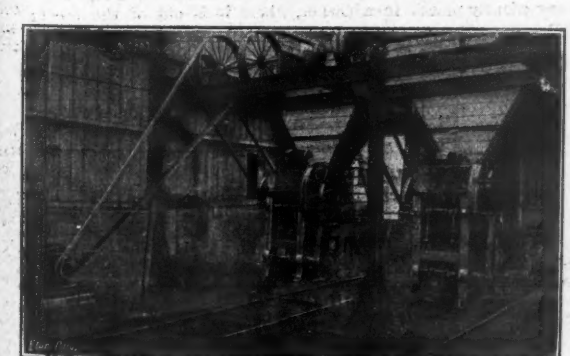

Fig. 1.—Electrically-Operated Briquetting Plant.

sufficient porosity to enable the heat action to come quickly and intimately into contact with the particles of ore contained in each briquette. There are, of course, numerous methods by which such ores can be agglomerated, some of which depend on the addition to the mass of a binder of organic or inorganic material. Although this has been adopted in some cases it is open to the objection that the weight content of the briquette in terms of actual ore is considerably reduced by the binder used, and in some cases doubt has been thrown upon the actual value of some of the binders used when exposed to the action in the blast furnace. The process which appears to have met with better results is the agglutination or sintering of the ore itself, by previous heat treatment, no additional binder being used.

When ores are treated in this way the first stage is their delivery in a suitably moist form to the briquetting press, where the mass is pressed heavily into moulds, giving them a firm and homogeneous structure. When this has been accomplished the briquettes are loaded on to trucks and then treated in some form of furnace, which may range from the ordinary brick kiln, which by the way is sometimes rather wasteful of fuel required for heating the bricks, to furnaces of the Hoffmann, Grondal Kjellin, or other special types. When the blocks leave such furnaces, the material, which was previously soft and friable in nature, is found to be sintered together and of sufficient hardness to withstand transport and firing in the blast furnace together with fuel.

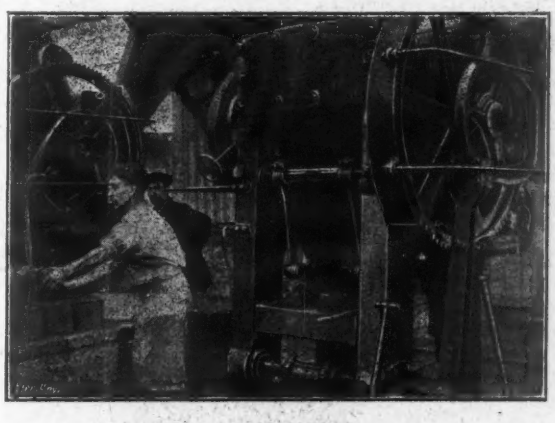

Fig. 2.—Machine for Briquetting Ore.

The bricks are also sufficiently porous to allow free play of the heated gases upon the ore.

One of the pioneering firms in the development of ore briquetting both in this country, on the Continent and in America is the Grondal Kjellin Co., who have both in the briquetting press and in the furnace developed special features which are worthy of interest. The presses are made of a very simple but solid nature, depending in their action on the raising of a ram or tup, which subsequently falls by gravity upon the material to be compressed ; this action proceeds with great rapidity, the feed of the ore being automatic, as also the ejection of the bricks. The kiln consists of a long tunnel of rectangular form with a furnace about its middle point, which furnace may be either coal fired, or, as in some cases, heated by means of producer gas. Through the rectangular flue a series of steel wagons passes slowly upon which are placed the bricks which have to be sintered. The wagons are butted together closely, and their sides fit into sand troughs, thus preventing any escape of heated gases, the bulk of which therefore passes over and through the bricks on the wagons. These bricks enter at the end from which the spent gases escape, and therefore on their way towards the furnace they are subjected to a steadily increasing temperature, which first of all drives off all moisture and then produces a sintering action. When they have passed the furnace they meet the incoming air which cools them, so that they are delivered from the kiln in a comparatively cold condition. The heat of the bricks is thus transferred to the air, which arrives at the point of combustion in a preheated condition. The whole process is therefore most economical.

It will be seen that at any rate as far as the briquetting portion of this process is concerned, a fine field is opened up for electric power, which is likely to become extended in the future as the supply of raw ore of good class becomes diminished. An interesting plant of this nature has recently been erected at the works of the Bede Metal and Chemical Co., Ltd., of Hebburn-on-Tyne, which produces about 140 tons of ore briquettes in each day of 24 hours, the process being a continuous one. This plant is illustrated in our views, fig. 1 showing the general appearance of part of the briquetting plant, while fig. 2 shows one of the briquetting machines at close quarters. This plant is interesting to electrical engineers from the fact that the electric drive is used in order to operate the briquetting

presses, and it has been found in operation that the whole system is most economical in working, and gives very fine results as to the briquettes produced, as they are hard enough to stand handling in transport or delivery and working in even the large blast furnaces which are now taking the place of the smaller plants which were formerly found to be of sufficient capacity to deal with the iron production requirements in this country. In view, therefore, of the increasing scarcity of ore which can be directly treated in blast furnaces and the increasing size of the furnaces themselves, it will be found worth while for electrical engineers to pay attention to the opportunity which is being afforded by the development of briquetting plant of this description.

NEW ELECTRICAL DEVICES, FITTINGS AND PLANT.

The "Omega" Testing Set.

This testing set has been placed upon the market by Messrs. Cecil Hodges & Co., Ltd., of Balfour House, Finsbury Pavement, E.C., who claim that it fills the requirements of electrical engineers for a high-class, reliable, self-contained ohmmeter and generator at a reasonable price. The instrument is enclosed in a polished teak case

Fig. 1.—"Omega" Testing Set.

on rubber feet, having a leather strap handle. The generator, as can be seen from the illustration, is fitted in the same case with the deflecting galvanometer, and the instrument is so arranged that with it the following tests can be made :—

1. Insulation resistance on a live circuit.
2. Insulation resistance on a dead circuit.
3. Measurement of the voltage of a live circuit.

The method of connecting-up the terminals of the instrument for these different purposes is very simple and easily understood. The apparatus weighs under 12 lb.

Universal Conduit Boxes.

A recent addition to the Simplex steel conduit system is a universal conduit box, designed with the object of providing one fitting for all the varied purposes which are met with in the

Fig 2.—Universal Box with Disk for Accessory.

Fig. 3.—Box with Sunk Switch.

average conduit installation. This box may be used as an ordinary junction box, a ceiling rose box, switch, pendant, or plug box, as desired. It is intended to meet the wants of the contractor, who can obtain these boxes ready drilled and tapped, but with the outlets stopped by means of small screwed plugs, which can be removed as desired, according to the number of ways wanted.

These boxes are supplied by Simplex Conduits, Ltd., of Garrison Lane, Birmingham.

The "Gem" Electric Twin Sweeper.

This machine, which is being placed on the market by Messrs. Duncan Watson & Co., of 62, Berners Street, W., embodies the good points of other suction cleaners combined with new ideas and improvements. One of the principal features of the twin sweeper lies in its having two slots or cleaning nozzles; in this way double the amount of actual cleaning is accomplished with one stroke of the sweeper. Each slot is 7 in. long, giving a total of 14 in. cleaning surface, whereas the majority of machines cover about 4½ in. to 6 in. The base of the

Fig. 4.—The "Gem" Twin Sweeper.

twin sweeper is arched, and between the two slots there is always a free passage for air on both sides, which means that the full volume of air is utilised at all times. The accompanying illustration shows the cleaner ready for use.

The handle is hinged, and can be operated from a vertical or horizontal position, and, owing to the manner in which it is connected to the machine, the cleaner is always in contact with the carpet and in just the proper position for cleaning. When not in use the machine stands upon its face or flat surface, the handle being kept in a vertical position by an automatic-catch arrangement, so that the machine occupies but little space, and can be conveniently placed in a corner, where it is out of the way and handy for use.

The motor and fan casings are of aluminium, and the handle nickel-plated, so that none of the parts can become rusty, and the machine presents a very attractive appearance. The machine takes about 100 watts.

Vickers Adjustable Reamer.

Messrs. Vickers, Ltd., of Vickers House, Broadway, S.W., have for some time past been manufacturing an adjustable reamer which has enjoyed a considerable amount of popularity. This reamer gave excellent results in practice, but it could only be considered as a high-class finishing tool. Having devoted considerable attention to the production of a reamer that could be used for a roughing as well as a finishing cut, Messrs. Vickers, Ltd., are now supplying a tool which fulfils these conditions. It is illustrated in figs. 5 and 6 herewith.

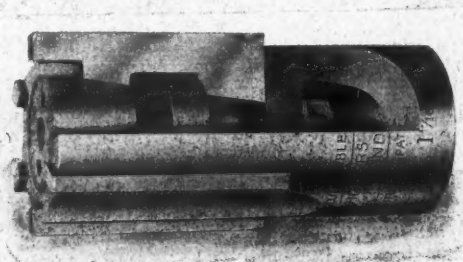

Fig. 5.—Vickers Patent Adjustable Reamer.

The construction of the tool is simple; it consists of the shell, cone-bolt, retaining ring, lock-nut and blades. The shell S is of steel, slotted and recessed to receive the cone-bolt C C and blades B B; the top of the shell is recessed to receive the key of the Morse taper or cylindrical arbor A. The cone on which the blades rest is interrupted and

threaded to take the collar, so that the internal edge of the blade rests on two truncated cones.

The lower end of the cone-bolt is graduated, and each division corresponds to a fractional part of an inch, or metric variation, in the diameter of the reamer. The other end of the bolt is threaded to take the lock-nut L.

The collar B screws on to the parallel and threaded part of the cone-bolt, and has a blind key-way which engages with a small pin let into the shell. The collar is thus fixed with regard to the shell, and any rotary movement of the cone-bolt results in its displacement in an axial direction.

The blades are strips of carbon or high-speed steel, and are wedge-shaped, so that the cutting edges are parallel when the blades are resting on the cone-bolt; they are also recessed so as to ride freely over the collar.

The adjustment of the tool is extremely simple. The operator, having dismounted the reamer from the arbor, inserts a box spanner

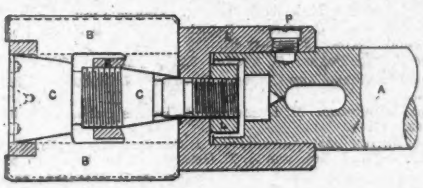

Fig. 6.—Section of Reamer.

and slacks out the locking-nut slightly; he then places an adjusting key in the pin-holes of the cone-bolt and turns it slowly in a clockwise direction.

Each small division on the face of the cone-bolt corresponds to $\frac{1}{2000}$ in. variation in diameter, and each larger division to $\frac{1}{1000}$ in., so that 10 large divisions must pass the zero mark to increase the diameter by $\frac{1}{100}$ in. With metric sizes each division is equal to $\frac{1}{100}$ mm. This done, the adjusting key is removed and the lock-nut screwed home, when the tool is ready for business. The removal of the box spanner and adjusting key prevents the reamer being tampered with. The displacement of the cone-bolt is comparatively small, and permits of a blind hole being reamed out, independently of the diameter to which the tool is set.

The new reamer is capable of taking a heavy cut with complete success. The blades are interchangeable, and the cost of a new set is very small when compared with the price of a solid reamer of equal diameter. Should the blades require regrinding, no special jig is required, as the reamer can be placed in the grinding machine and the blades touched up in the usual manner.

Drum Type Star-Delta Starters.

Mr. George Ellison, of Victoria Works, 17 and 18, Warstone Lane, Birmingham, has put on the market a totally enclosed starter of the drum type on the star-delta principle, for starting squirrel-

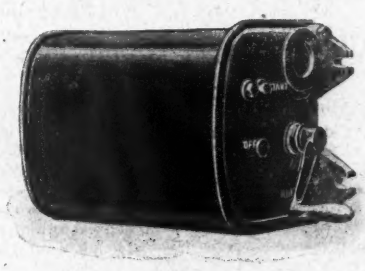

Fig. 7.—Star-delta Starter, as Mounted on Wall.

cage three-phase motors; it is made for 20 H.P., at 200 to 550 volts, or 10 H.P., at 110 volts, and is shown with and without the cover in the accompanying illustrations. The starter cannot be left in the starting position, and as it completely isolates the motor in the

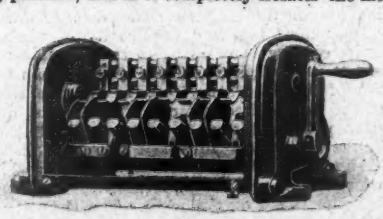

Fig. 8.—Starter with Cover Removed, showing Drum and Adjustable Contact Fingers.

off position, a main switch is unnecessary. An interlocking mechanism can be added if required, to ensure operation in correct sequence. The contacts are adjustable for wear, and are easily renewable; they are designed to carry 50 amperes continuously.

Steel Reflectors.

Messrs. Simplex Conduits, Ltd., of Garrison Lane, Birmingham, have recently introduced a line of steel reflectors manufactured on the Holophane-Benjamin patents. We illustrate in fig. 9

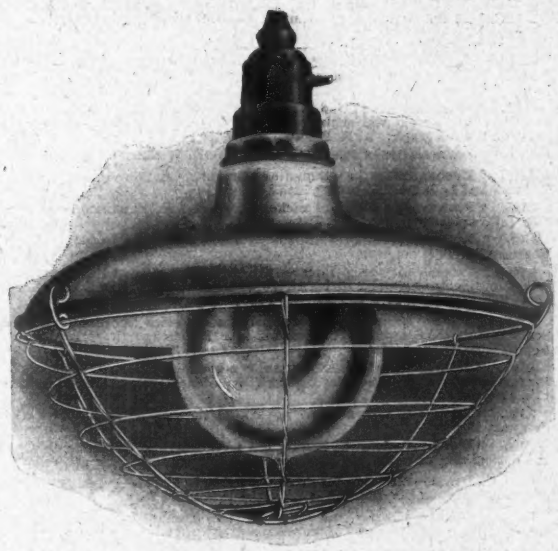

Fig. 9.—Enamelled Steel Reflector for Factory Lighting.

a vitreous enamelled steel reflector of this type for factory and shop lighting, or for outside lighting in conjunction with a watertight holder. The reflector is designed with a 1½-in. hole to take a

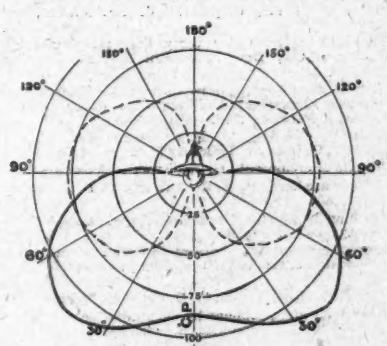

Fig. 10.—C.P. Curve for 100-c.p. Lamp and Reflector.

standard cord grip holder, is 12 in. diameter, and suitable for use with lamps up to the 100-c.p. round bulb size. The candle-power curves in fig. 10 show the class of illumination to be expected.

"Cracore" Solid Bitumen Cables.

A new type of bitumen cable has been brought out and patented by Messrs. W. T. Glover & Co., Ltd., of Trafford Park, Manchester. Until quite recently it was impossible to manufacture twin-core bitumen insulated cables of the solid type (that is, having no fibrous materials on or between individual cores), owing to the fact that the mechanical pressure between the cores of twin cables was such as to necessitate the use of these fibrous coverings as a means of reinforcing the mechanical structure generally.

In the "Cracore" cables the makers overcome this difficulty by laying each bitumen-insulated core in a cradle of vulcanised bitumen, which is shaped to a suitable section to receive it. The mechanical pressure between the cores, instead of being concentrated along the line of contact, is thus well distributed over the surface of this central cradle-shaped web. It is thereby made possible to dispense with the support formerly provided by the tapes and braids on individual cores, and by applying their ribbed sheath of bitumen overall, Messrs. Glover secure all the advantages of their well-known patent solid three-core bitumen cables.

This "Cracore" construction can be applied to multicore cables as well as to twin cables, and it is particularly advantageous to do so for multicore cables which have conductors, say, of less than 7/16 S.W.G.

Algerian Tramways.—The T.C. of Bône is contemplating the establishment of electric tramways and the erection of a generating station at an estimated cost of £30,000.

NEW PATENTS APPLIED FOR, 1912.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by Messrs. W. P. Thompson & Co., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

4,090. "Electrically heated cooking utensils." W. F. Perry. February 19th.

4,091. "Apparatus to be fitted to an engine room telegraph which will cause a bell to ring should the engines be set going in a direction contrary to the order on the telegraph. A. H. Baker. February 19th.

4,106. "Enumeration of telephone calls." S. D. Williams. February 19th.

4,119. "Mechanism for the automatic control of reversible electric currents." G. Inrig and L. Inrig. February 19th.

4,125. "Process or method of nickel plating." W. Fuerhake. February 19th. (Complete.)

4,127. "Rotatory pot-shaped troughs for electrolytical baths." M. Huttig. February 19th. (Complete.)

4,140. "Process for the complete utilisation of ring-spinning machines driven by electro-motors capable of control." J. Kemmerich. (Convention date, February 18th, 1911, Germany.) February 19th. (Complete.)

4,165. "Circuit arrangements for polyphase series motors." Siemens Schuckertwerke G.m.b.H. (Convention date, February 18th, 1911, Germany.) February 19th. (Complete.)

4,167. "Method of ignition in internal combustion engines." Gasmotoren-Fabrik Deutz. (Convention date, March 27th, 1911, Germany.) February 19th. (Complete.)

4,179. "Telephone systems and apparatus therefor." E. A. Mellinger. February 19th.

4,185. "Electro-mechanical device for recording and reproducing sounds and optical impressions." M. E. Thomas. February 19th. (Complete.)

4,186. "Dynamo-electric machines of the homopolar type." British Thomson-Houston Co., Ltd. (J. E. Noeggerath, United States.) February 19th.

4,187. "Dynamo-electric machines of the homopolar type." British Thomson-Houston Co., Ltd. (J. E. Noeggerath, United States.) February 19th.

4,233. "Electro-magnetic device for warning against theft and burglary." H. L. C. Neuilly. (Convention date, September 11th, 1911, France.) February 20th. (Complete.)

4,250. "Incandescent electric lamps." S. C. C. Mitchell. February 20th.

4,251. "Electrodes or anodes employed in the prevention of corrosion in steam boilers and other liquid-containing structures." P. E. G. Cumberland. (Divided application on 19,637/1911, September 4th.) February 20th. (Complete.)

4,264. "Trolley sockets for electric traction systems." E. M. Munro and R.E.T. Construction Co., Ltd. February 20th.

4,275. "Electrically-operated safety suspending or retaining apparatus for winding, hauling, and analogous plant." Crompton & Co., Ltd., and W. J. Picken. February 20th.

4,276. "Signalling systems for party line telephones and the like." Western Electric Co., Ltd. (Western Electric Co., United States.) February 20th.

4,283. "Means for accelerating or retarding the variations of electric fields." Allmanna Svenska Elektriska Aktiebolaget. (Convention date, February 24th, 1911, Sweden.) February 20th. (Complete.)

4,303. "Electric couplings." H. Appenzeller. (Convention date, February 20th, 1911, Germany.) February 20th. (Complete.)

4,358. "Electric telephones." L. G. Hammer. February 21st.

4,365. "Electric arc lamps." A. G. Way and C. F. G. Thorkelin. February 21st. (Complete.)

4,382. "Brush or the like for the medicinal application of electricity." H. Weiss. February 21st. (Complete.)

4,383. "Protecting continuous-current electric systems, and means for use therein." Electric Construction Co., Ltd., and J. McMillan. February 21st.

4,399. "Electric heating devices." G. Cooper. February 21st.

4,407. "Telegraphy and telephony by submarine cables, long-distance overhead lines, and the like." J. Schiessler. (Addition to 4,061/1912. Convention date, April 3rd, 1911, Austria.) February 21st. (Complete.)

4,458. "Electro-magnetic reversing gear." B. Brukwicki. February 22nd. (Complete.)

4,460. "Alternating-current dynamo electric generators." Akt.-Ges. Brown, Boveri et Cie. (Convention date, February 22nd, 1911, Germany.) February 22nd. (Complete.)

4,498. "Construction of two-way electric switch." G. Marky. February 22nd.

4,525. "Motor vehicles with electric transmission." Crompton & Co., Ltd., J. C. MacFarlane and H. Burge. February 22nd.

4,529. "Dynamo electric generators." British Thomson-Houston Co., Ltd., and E. Garton. February 22nd.

4,552. "Distribution and measurement of electricity." E. Booth and N. R. Booth. February 23rd.

4,577. "Electric switches." M. J. Railing and J. Strachan. February 23rd.

4,585. "Transmitter for printing telegraph systems." P. Etienne. (Convention date, February 24th, 1911, Germany.) February 23rd. (Complete.)

4,586. "Electric lighting and the like." E. B. Watson. February 23rd.

4,588. "Electric vapour apparatus with several liquid electrodes." Elektrotechnische Industrie m.b.H. (Convention date, November 10th, 1911, Germany.) February 23rd. (Complete.)

4,592. "Brush-holders for dynamos, electric generators or electric motors." Morgan Crucible Co., Ltd. and J. E. Grant. February 23rd.

4,595. "Electric cut-outs for overhead conductors." F. Petras. February 23rd.

4,598. "Spring coupling for shafts." R. Bosch (firm of). (Convention date, March 22nd, 1911, France.) February 23rd. (Complete.)

4,655. "Telephones." E. R. Timmis. February 24th.

5,670. "Stuffing boxes employed for packing and sealing the ends of electric cables in joint boxes and the like." J. Stratton and E. A. Claremont. February 24th. (Complete).

4,671. "Method of and means for joining electric wires and cables." J. Stratton and E. A. Claremont. February 24th. (Complete.)

4,682. "Switchboards used in connection with electrical installations on motor-cars and like vehicles." C. A. Vandervell and A. H. Midgley. February 24th.

4,686. "Brush-shifting mechanism for dynamo-electric machines." British Thomson-Houston Co., Ltd., and A. P. Young. (Divided application on 13,650, 1911, June 7th). February 24th.

4,691. "Speed-regulating devices, more especially for use in connection with electrically controlled continuous spinning frames." Soc. Jacquet Freres. (Convention date, February 24th, 1911, France.) February 24th. (Complete.)

4,698. "Telephone exchange circuit." Siemens Bros. & Co., Ltd. (Siemens & Halske Akt.-Ges., Germany.) (Addition to 11,251, 1910.) February 24th. (Complete.)

4,699. "Interrupter for electric ignition of internal-combustion engines." A. G. Bloxam. (Firm Robert Bosch, Germany). February 24th. (Complete.)

PUBLISHED SPECIFICATIONS.

Copies of any of the Specifications in the following list may be obtained of Messrs. W. P. Thompson & Co., 285, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1911.

Automatic Time-Switch. H. F. J. Thompson and J. H. Bowden. 2,283. January 30th.

Separators and Sheaths for Electrodes of Secondary Batteries. J. De Karavodine. 2,493. January 31st.

Device for Electrically Igniting Miners' Safety-Lamps. J. Prestwich. 2,552. February 1st.

Wireless Signalling. R. Fessenden. 2,617. February 1st. (February 2nd, 1910.)

Electrical Systems and Apparatus for Railway Signalling. J. P. O'Donnell and British Pneumatic Railway Signal Co. 2,887. February 4th.

Switch Systems for Electric Lighting. J. A. W. Ward and F. A. Walmisley. 2,911. February 4th.

Electric Heaters. M. M. Kohn. 2,968. February 6th.

Fusible Electric Cut-Outs. British Thomson-Houston Co. and E. B. Wedmore. 3,764. February 4th.

Electrical Fuse Boxes. G. Austin. 3,779. February 15th.

Electrical Heating and Cooking Devices. N. Prentice. 3,883. February 15th.

Electric Conductors. H. Evans and St. Helens Cable & Rubber Co. 3,996. February 16th.

Electric Switch for Controlling a Combination of Electric Circuits Peto & Radford, Ltd., and H. M. Genese. 4,521. February 22nd.

Process and Apparatus for Transmission to a Distance, by Electricity, of Pictures, Writing and the like. R. de Bernochi. 8,017. March 28th. (April 1st, 1910.)

Electrical Switches or Distributing Devices. V. R. Rawlings. 10,318. March 28th.

Electric Heating Devices. British Thomson-Houston Co. (General Electric Co.) 10,549. May 1st.

Electrodes for Secondary Galvanic Cells. H. P. R. L. Porsche and J. A. E. Achenbach. 10,859. May 4th. (January 27th, 1911.)

Vapour Electric Devices. British Thomson-Houston Co. (General Electric Co.) 11,140. May 8th.

Electrically-Controlled Valves. A. N. Nicholson and A. W. Brooking. 12,118. May 19th.

Supporting Devices for Electric Illuminating Bodies. J. Friedreich. 13,026. May 30th. (May 30th, 1910.)

Apparatus for the Control of Gas Valves and Electric Switches. A. J. Boult. (Kanagy & De Smet.) 14,427. June 24th.

Registering Circuits for Automatic Telephone Exchanges. Siemens Bros. & Co. (Siemens & Halske Akt.-Ges.) 15,129. June 28th. (June 28th, 1911.)

Wiring of Electric Installations. H. W. Handcock. 18,181. August 10th.

Electric Oscillation Circuits and their Connections. W. P. Thompson. (Ges. für Drahtlose Telegraphie.) 18,281. August 11th.

Electrodes for Electrical Furnaces. Planiawerke Akt.-Ges. für Kohlenfabrikation Ratibor. 18,733. August 19th. (October 6th, 1910.)

1912.

Starting Means for Vapour Electric Devices. F. Conrad. 37. January 1st. (January 7th, 1911.)

Adjustable Inductance Coils. R. A. Fessenden. 346. January 4th. (February 2nd, 1910. Divided application on No. 2,617 of 1911. February 1st.)

Telephone Receivers. A. Rosenberg. 600. January 8th. (Divided application on No. 2,612 of 1911. February 1st.)

A Campaign against Labour Union Tyranny.—In view of the widespread feeling in favour of the repeal or amendment of the Trade Disputes Act, 1906, a measure that has been described as "the charter of labour union terrorism, violence and outrage," the Council of the Liberty and Property Defence League invites the co-operation of all those who desire to safeguard the freedom of labour and the interests of the public against the evils of "peaceful persuasion" in a national demand for the alteration of the law. The many scandalous examples recently witnessed of the manner in which the legalised intimidation exercised by mobs of labour union pickets and their followers results in the destruction of personal rights and the disturbance of public order have convinced all peaceful citizens of the need for not only strictly limiting the powers of the unions as regards picketing, but making the unions responsible, like all other classes of the community, for their actions. It is unlikely that Parliament will move in the direction desired unless an organised public protest is made against the continuance of the existing menacing and lawless state of things. The unions represent a minority of the wage-earning classes of the country; but, owing to the fact that this minority is organised, it is powerful in defence of its claim to enjoy, under the sanction of the law of the land, the right to threaten, bully and attack the unorganised majority. The Council of the League suggests that public petitions in terms similar to the resolutions adopted by the Justices of Liverpool and other places should be placed for signature in all parts of the country, and these should be sent, when complete, to local Members of Parliament for presentation in the House of Commons. The Council also suggests that wherever practicable public meetings should be held in support of an amendment of the law; and that the question should be raised at political meetings, at which either a member or a Parliamentary candidate is present. It is believed that by these means the true feeling of the country may be demonstrated, and Parliament moved to action. The secretary of the League will be glad to send copies of petitions where desired, and to give advice as to the methods of the suggested campaign. Communications should be addressed to the offices of the League, 25, Victoria Street, Westminster.